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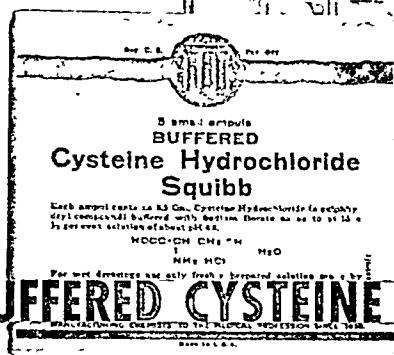
THE NEW YORK ACADEMY OF MEDICINE

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¹ Appointed, March 28, 1934, to fill the unexpired term of Dr. Ewing.

² Resigned, March 28, 1934.

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BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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No. 1

Address of the Retiring President STANDARDS - ACHIEVEMENTS*

BERNARD SACHS

Members, Fellows and Friends of the Academy:

In keeping with a wise and generous tradition of The New York Academy of Medicine, the retiring president is expected to give an account of his stewardship.

The years 1933 and 1934 have not been altogether placid; but in spite of some stormy days, the ship is safe and ready for further voyages into uncertain and uncharted seas. Whether or not my own estimate of the past years be correct, I have no hesitation in stating that the officers, the Trustees and the Council have constantly kept in mind the purposes to which the Academy is devoted. In the science and practice of medicine, the Academy this day stands more firmly than ever as a supporter of the highest ethical standards.

In medical science, it is the establishment of unquestioned truths that is its chief goal, and in the practice of medicine it insists upon the observance of the highest principles of honesty and integrity in the relation of the profession to the community.

* Delivered at the Annual Meeting of the Academy, January 3, 1935.

Let me say again, as I did a year ago, there must be no compromise in the matter of the division of fees. The acceptance of any gratuity, except with the full knowledge of the patient or of the patient's family, I deem outright dishonesty and the practice must be eliminated by the profession, and surely by the Members and Fellows of the Academy. I am happy to state, and I know it from personal intimate knowledge, that the members of the Committee on Admission will not accept any candidate who has been guilty of such practice. Membership in the Academy is to convey to the profession and to the community positive assurance that the individual in question is a man or woman of unimpeachable character and deserves the confidence of the public.

In this troublesome question, I appeal for similar action on the part of all other medical societies. I have been told only recently, that when a hospital in our community brought about the dismissal of one of the medical men because of questionable practice, a prominent society refused to take action. Let me also state distinctly that this is not a practice limited to any one group or locality, but it is a deadly poison that has been slowly invading and commercializing the entire medical body.

We cannot possibly discuss the standards of the practice of medicine without referring to the changing economic conditions of the day. As His Honor, the Mayor, suggested in his recent notable address, whether we acknowledge it or not, we are living in "a new age" and the physicians must adjust themselves to changing conditions in civil and communal life. The man who survived the economic depression, was, nine times out of ten, the one who knew how to adjust himself to these changing conditions, and whether we like it or not, we are bound carefully to consider altered economic conditions. Referring to the progress of medicine and surgery, His Honor asked whether the benefits are to be "limited to a certain few who can afford to avail themselves of it, or is it a matter in which the public and the government, and the State have a direct interest?"

Personally, I am not going to allow myself to be intimidated by the tirades and arguments for or against socialization of medicine or state medicine. All I wish to emphasize is that conditions have changed, conditions are changing, and if the average medical practitioner is to have any sort of success in a practical way, if he is to be able to earn his living, he must take council with his colleagues: and all of us must in a sensible, calm mood discuss the changes that are to be effected in our relations to family practice, to individual patients, in our relations to the hospitals, to the community, the city and the state.

Last summer, I had occasion to travel from the Atlantic to the Pacific Coast, and throughout the middle and far west, I found that the medical organizations were fully alive to the need of change and reform in their methods of practice. Local conditions are so important and vary so much that I believe it would be unwise, except perhaps in some underlying principles, to plead for national reorganization of professional practice. But the changes, whatever they may be, must come from within the medical organization rather than from without; let us beware lest by legislative enactment, disappointment and despair be brought to many medical groups and communities.

In a city like Seattle, the medical profession has taken the matter in hand and has brought about adequate reforms which seem to be well adapted to the needs of that community. In our far larger communal organization, it will require the active cooperation and study of our best minds to protect the interests of the community and especially to promote and protect the interests of the practitioner, so that the doctor may not, in the end, prove to be the forgotten man.

Our hospitals and the physicians serving therein must find adequate compensation, somewhere and somehow. We cannot merely copy foreign insurance systems—British or German. We are not yet ready to copy the German system, according to which, as I am reliably told, only 5 per cent

of the physicians are doing private practice exclusively; 80 per cent are practically in the employ of a panel system. The system itself has led to great abuses. Certification of illness and over-prescribing have become a serious problem and worse than this, mass treatment has led to a very superficial type of medical examination. All of this we do not wish to copy, and we must devise our own system in conformity with our local needs and practices. With due consideration to the needs of the community, let us also try so far as possible to preserve the rights and privileges of the honorable practitioner. In developing an entirely new system in this community, we may incidentally be able to do away with the fee-splitting evil.

In our relations to city and state, I am happy to say that there is ample reason to believe that the influence of the Academy, in all matters medical, has been steadily growing. Our advice has been sought in puzzling questions presenting themselves to the state and the city administration, and we are proud to be the trusted advisers of the Department of Health, and the Department of Hospitals, not to forget the Department of Sanitation, which has always maintained close relations with the Committee of Twenty, which is an offspring of this Academy.

The Committee on Public Health Relations, under the chairmanship of Dr. James Alexander Miller, and its excellent secretary, Dr. Corwin, has not only sponsored the study of maternal mortality—to which I shall devote a few minutes later on—but it has also been responsible for an intensive study on Diabetes in New York City; another study on Amoebic Dysentery; then again, it made an impartial study of the Psychiatric Department of Bellevue Hospital; a special study on the proper organization of the medical service in the Department of Education; not to mention a study, asking for better facilities for the care of the chronic sick; and other studies of almost equal import.

The Committee on Medical Education, under Dr. Harlow Brooks, ably assisted by Dr. Reynolds, has continued its wonderful work in the preparation of the Graduate Fort-

night. It has devoted much thought to the proper training of interns, residents, and specialists and has helped to maintain the general high standards of scientific work on the part of Academy Sections and Members.

Our Library, under Dr. Malloch's leadership maintains its proud position as one of the greatest and surely one of the most useful medical libraries of the world. The Medical Information Bureau has done good work in keeping the public and the medical profession informed on the various scientific and other activities of the Academy and of the medical profession of Greater New York.

In all the Sections, there has been a renewed spirit of activity. The very large attendance at many of these special gatherings, and at the combined meetings of several sections, yields the best evidence of the intense interest the average physician takes in his immediate line of work. If I were to find any fault with this spirit, it is that the special groups might bear in mind, more than they do, the way in which their subjects bear upon the general problems in medicine and surgery. They might more often than they do, suggest problems which should be brought to the notice of the entire profession, and the discussion of such problems might be arranged for the Stated Meetings of the Academy. This would make it a little easier for my successor to find special topics of interest than it has been during the past years. These Stated Meetings are occasionally well attended, but they should be among the chief interests of the Members and Fellows of the Academy.

It is only when controversial subjects are brought to the notice of the profession that the interest of the entire profession seems to be aroused. During my presidency, the two subjects that may be placed in this category, were the Report on the Costs of Medical Care and the Report on Maternal Mortality. Although the manner of publicity of this latter report was not altogether fortunate, let me say that nothing that the Academy has done during the past years has had as far reaching an influence on the improvement in medical practice as has this report.

This was an attempt to establish the exact truth, and I am pleased to say that on a recent visit to the chief medical centers of the country, mention was made again and again of the splendid and courageous work the Academy had done in publishing this report on Maternal Mortality. To soothe our ruffled feelings, and to assuage local or national pride, it is well to let the medical and lay public know that other cities and countries are face to face with the same problem that confronts us here.

In a recent London letter, in the Journal of the American Medical Association*, there is an interesting communication on the undiminishing maternal mortality in Great Britain. It is stated that the maternal death rate is still slightly increasing, and to quote from that article, it had been shown authoritatively that half the maternal deaths in Great Britain were preventable. Whether preventable means on the part of the medical man, the midwife, or the mother, I need not now decide.

In Philadelphia, conditions were not unlike those that obtained here. It may be comforting to read in one of the late Bulletins† of the New York State Department of Health, that the Maternal Mortality problem in England and Wales was closely similar to our own; but is it not reassuring to read in the issue of December 17th, of the outstanding fact that the maternity mortality rate in this state was "the lowest ever recorded for any month"; and still more reassuring that the number of deaths from causes associated with childbirth totaled 45 as compared with 63 of the preceding October—the reduction being due to a decrease in the mortality from hemorrhage and accidents of childbirth (including cesarean operation). The leaven is working.

But, there is something else alluded to in the British report, which has been in my mind for many years, and which on many occasions I have discussed. After we have done our best about maternal mortality, let us pay some

* December 8, 1934.

† Health News, Dec. 10, 1934.

attention to child mortality, which has changed but slightly during recent years, and above all, let us consider carefully the suffering in later life from neglected or improper natal and prenatal treatment.

It seems to me to be far nobler to acknowledge our shortcomings, to try to improve upon them, than to become irate because others have told us what our shortcomings are.

Among the scientific achievements of the Academy, the Annual Graduate Fortnight has been possibly the most outstanding. At all events, we have in that way brought to a very large number of physicians the knowledge of most recent developments on burning questions of the day. In connection with the last two Fortnights, the exhibits have been so illuminating and startling that it has brought to the fore the question of whether such exhibits should not be made more or less permanent, and, in keeping with this project, the development of a medical museum should be carefully considered.

I must not fail to refer to the one sad event occurring during my presidency. Dr. Linsly Williams' death was an incalculable loss to the Academy. It was not only the loss of a great director, but the loss of an astonishingly strong personality, and of a friend whom none of us can forget.

Fortunately, the affairs of the Academy could be entrusted to the firm hands of Dr. John A. Hartwell, whose intimate acquaintance with the details of Academy work helped us to tide over a period that might under other conditions have spelled disaster. While the director is in charge of the innumerable details of the Academy machinery, the president has ample opportunity to influence the policies of this great organization, and in order that such renewed influence and invigoration may be brought to bear upon the affairs of the Academy, and in order that the Academy may never be entirely subordinated to the will of a small group of men, it is wise that the term be limited to a period of two years.

In concluding my own term of office, let me tender my warmest thanks to the staff, the officers and Council of the Academy, and to the entire fellowship for their courteous and cordial cooperation.

These two years of service have been the most interesting and surely the most stimulating of my career. I was hoping, just at this juncture of events, that the Nominating Committee should suggest, and that you would elect, as my successor, a man of known energy and ability, and above all, a man of broad vision and of liberal spirit, who would treat the entire membership of the Academy with justice and sympathy; and who, while aiming at the further progress of medical science would be an ardent protector of the medical practitioner and of the man who devotes himself exclusively to medical research. Having found a man of outstanding fitness, it is my pleasure and my privilege to present to you, your new President, Dr. Eugene H. Pool.



Address of the Incoming President

PROBLEMS FACING MEDICINE*

EUGENE H. POOL

Four score and eight years ago our medical forebears organized an association called The New York Academy of Medicine, dedicated to:

The cultivation of the Science of Medicine.

The advancement of the character and honor of the Profession.

The elevation of the standard of Medical Education.

The promotion of the Public Health.

Is it not appropriate that we now take stock and give an account of our stewardship?

One is immediately convinced of our material development by a review of the illustrations in the Portrait Case of the Library. There we see in turn the little hall in Wooster Street in which the earliest meetings were held; the "new Library Hall" on 31st Street, first used in 1875, and vacated 14 years later for the large building on 43rd Street, and finally the superb structure which we now occupy. This houses a medical library surpassed in this Country only by that of the Surgeon General, enriched by a large collection of early medical books including incunabula which afford unrivalled opportunity for the medical historian and scholar. What a congenial, uplifting and stimulating atmosphere the Library affords in its commodious reading rooms, and research units; offered to the Community, lay and professional, members and non-members, New Yorkers and visitors. For, let it be known that the Library is available to all. The Academy also provides lecture halls, section rooms, exhibition space and offices for many of the accredited medical activities and societies of the Community. A large part of the intellectual scientific medical life of the City takes place within its walls.

* Delivered at the Annual Meeting of the Academy, January 3, 1935.

I will not detail the conspicuous accomplishments of the numerous standing and special Committees, such as Education, Graduate Fortnight, and Committee on Public Health Relations, since these have been referred to by the previous speaker. They represent an enormous amount of highly intelligent and constructive effort, and are the direct result of the plans of our founders whose wisdom and foresight is evidenced in their Constitution and By-Laws and by the Code of Medical Ethics adopted in October, 1847.

Let me quote: On physicians "devolves, in a peculiar manner, the task of noting all the circumstances affecting the public health, and of displaying skill and ingenuity in devising the best means for its protection," and "by the judicious application of Public Hygiene, to prevent disease and to prolong life." Effective efforts in this direction have been continuous since the early sixties when the Academy stimulated the adoption of a State law to provide a better milk supply and did much to improve the sanitary conditions of the Army during the Civil War. Its activities in recent years are familiar to you and need not be reviewed.

In the Act of Incorporation, June 23, 1851, we find the significant clause that "said Corporation shall have power to make and adopt rules and regulations for the admission, suspension and expulsion of its members." The character of our membership is thus safeguarded. The provision affords a disciplinary measure which has been judicially but uncompromisingly used. Fortunately, the necessity for its application is unusual.

Through the Medical Information Bureau, the public are properly informed on medical progress without impairing the dignity of the profession by any semblance of advertising.

The Academy has taken a prominent part in the development of preventive medicine which implies curtailment of disease, limitation of disease complications and prolongation of life with some control of the accompanying dis-

abilities of old age which too often render longevity undesirable. Its publication, the Health Examiner, is devoted exclusively to this important problem.

From this brief summary it becomes evident that the Academy has been directed and is functioning in conformity with the plans of its founders.

Probably the greatest misfortune the Academy has experienced in its whole history occurred during the past year in the death of Dr. Linsly R. Williams. He was largely responsible for the remarkable developments in the Academy during the last decade. But more important, his wisdom and administrative ability coupled with unusual kindness and tact made his influence nation wide. To the public and to the profession his loss is a supreme tragedy. As the result of years of thought, he had formulated ideas and plans for the future of the Academy. No man could penetrate the depths of his mind and assimilate these ideas, consequently much of value has passed with him. It is, therefore, incumbent on the new administration to build afresh. It is necessary for us to consider and develop plans and policies for our immediate future.

What is our position?

The world, the nation, the profession are in a period of reorganization and revolutionary change in which the Academy must take part. Individualism and capitalism are weakening, communism and socialism threaten. A new deal faces medicine which like our National New Deal must be experimental. The depression has resulted in increased poverty and unemployment. The indigent must be fed, clothed and sheltered, but, what is of prime importance to us, they must be cared for when sick.

But the profession itself has suffered in proportion. A much larger part of the population has been removed from the class of paying cases. In the readjustment the doctor also must be protected by adequate remuneration for medical service.

This, then is a time when the profession must present a united front. As stated in our original code: "By union alone can medical men hope to sustain dignity and extend the usefulness of their profession." And further, they must "firmly yet mildly insist on their rights; and this not with a glimmering perception and faint avowal, but rather with a full understanding and firm conviction."

While the Academy is not a part of organized medicine, it certainly does not represent disorganized medicine. By virtue of its position the Academy should be a stabilizer of the medical ranks. For that reason we should cooperate with such organizations as have the best interests of medicine at heart.

And so we come to some of the problems that at the moment face the profession, such as proper laws for Workmen's Compensation, medical education and provisions for the hospitalization and care of the sick.

One can call attention to such features in our structure which are weak and should be corrected, but no one man can present the proper solutions.

The question is often raised as to whether it is the function of the Academy to take an active part or leadership in such problems. I believe it is our obligation to participate in any movement which is vital to the profession or to the public health. There is, moreover, a precedent in that the Academy has already been impressed into such service. It accepted the obligation of acting in an advisory capacity in Governor Lehman's efforts to improve the Workmen's Compensation Law. Whether we lead, cooperate or assist, to my mind, is immaterial. Our motives should be the advancement of medicine, the honor of the profession, the elevation of medical education and the promotion of the public health. Sufficient honor will redound to the Academy for work well done.

But tradition and expediency indicate that the Academy limit the scope of its activities; that it should confine its efforts to broad problems: ethics not economics, policies not politics, corporate rather than individual welfare. Let us be critical but constructive. Let us as a profession offer

solutions to problems which are vital to the profession rather than have forced on us methods devised by laymen and legislators while we are slumbering or occupied in debate.

Two years ago, the Governor, recognizing the weaknesses and injustices in the Workmen's Compensation Law, appointed a committee of ten, five from the Academy and five from the State Society to study the problem and recommend appropriate legislation. A review of the origin, life history, and obsequies of the report of this Committee will be enlightening as an illustration of the difficulties and obstacles which are encountered in attempting legislative correction of defects or maladjustments in existing laws.

The committee innocently labored to present a satisfactory solution, with no recompense, with no appropriation. It was recognized that the law was conceived in the interests of the injured worker; that it is he who was and must be the major consideration; that the medical profession plays an important part but necessarily secondary. The recommendations were drafted with these as the basic conceptions. It was recommended that limited free choice be allowed, that the professional ability and integrity of those caring for the injured be assured, that exploitation, racketeering and advertising be eliminated, that organized medicine be responsible for the character of the work and the personnel. The technic of organization with every possible safeguard was carefully framed. The officials of the Compensation Bureau were, or seemed to be, won over. But self insurers and carriers, with whom we met repeatedly, opposed uncompromisingly throughout. They represented the railroads, industries, traffic, public utilities and insurance companies. They all lined up against it and presented a united opposition. They objected particularly to any semblance of free choice, which we regarded as an inalienable right of the injured and a basic principle in the relation between doctor and patient. Then every cult, including Christian Science, wanted representation and equal rights. After ten months of study, the Report was presented to the Governor who expressed satisfaction and referred it to

the State legislature with recommendations for its adoption. A bill was drafted. Just before the Legislature adjourned, the committee, with the proponents and opponents of the bill, was called to a hearing before the Senate Committee. Many attended at considerable trouble and expense. One Senator was present. Scant attention was shown during the presentation of pleas for the bill, and interest awakened only when Labor with Irish wit made an impassioned address, to the surprise of everyone, for the bill. So we lined up, medicine, allied with labor at the eleventh hour, against the representatives of the carriers and self insurers, some 15-20 in number. They said little but one felt the influence of the companies which they represented. The bill was not taken out of Committee. Our case was lost.

We were asked repeatedly, why does not the profession purge and clean for itself; why must a law be passed for this purpose. Cleansing of the profession was not the object of the bill. This was merely a necessary factor for its effective operation and organized medicine agreed to do it. The State Society and its subsidiaries, the County Societies, were willing to burden themselves with the arduous and expensive work necessary to operate the proposed system.

It may interest you to learn that although the bill was killed last year it has not been allowed to remain dead; its resurrection is imminent. A Workmen's Compensation Act on the lines suggested by the Medical Committee will be presented again at the present Session of the legislature.

Education! What maddening thoughts and memories the word itself stirs in every mind; time ill spent, opportunities lost, goals unachieved. Its furtherance is one of our foremost duties. Undergraduate education is not within our province nor can we seriously criticize the results. Who of us does not envy the fourth year graduate whose mind is filled with all there is of medicine; refined, cured and complete. But as years go on this fundamental knowledge slips, and too often, due to the intensity of practice and other interests, there is likewise failure to keep fully informed of subsequent progress. Many practitioners have not the

books, periodicals, hospital connections, clinical opportunities, personal associations or individual drive to keep them abreast of the times. Much is being done by the Academy, hospitals and schools to meet the needs. The Graduate Fortnight, with its clinics, exhibitions and lectures offers instruction to hundreds. A study is in progress as to internships and the facilities offered for the training of graduates in the hospitals of New York. But can we not do more? Should we not open branch libraries and stimulate further postgraduate courses?

Certainly the weakest link in the chain of medical education is in postgraduate surgery. It is well nigh impossible under present conditions to provide operative instruction. Would it not be well for a study to be made of this phase in the hope that with the cooperation of the hospitals and schools more effective provision may be made to satisfy the needs of at least a proportion of those who desire and are worthy of such special training?

"The poor always have ye with you." These words are probably even more significant now than when spoken, in view of the vast problems which these unfortunate folk unwittingly have woven into the present day social fabric. One of these problems vitally affects the medical profession. For upwards of 100 years public institutions and private hospitals of this City have cared for the indigent sick. The doctors in general are not paid but are rewarded by the experience and the honor of a hospital connection, except in certain State or municipal institutions for chronic ailments where the medical attendants are salaried. As a result of the depression we are now overwhelmed by the numbers of sick with insufficient accommodations for their care. The community can meet its obligation to some extent by providing more beds and home care. But what about the doctors?

The problem as it affects them has arisen as a result of the increasing proportion of the population who cannot pay. The profession cannot treat gratuitously ever increasing numbers without themselves becoming impoverished.

If the profession of medicine does not offer at least a living wage, it will lose a necessary attraction and candidates will become too few and of inferior grade. Let me give concrete evidence as to what the profession is doing. In 1933 our municipal and voluntary hospitals provided 9,500,000 patient days care and 6,800,000 out patient visits for which the doctors received with few exceptions no recompense. For the month of September, 1934, Home Relief and Work Relief expenditures in the City amounted to \$12,800,000 of which only 4.1 per cent went for medical services. How can we reconcile the obligations of caring for the needy and properly recompensing the physician for that care?

The population divides itself into three financial groups.

1. The dependent class, which can pay nothing.
2. The independent class, which can pay all.
3. The intermediate class, which includes all grades between the two.

This last is the most significant. In size it fluctuates, but it has reached enormous proportions. It can pay something, perhaps all in cases of short duration; a varying proportion in major or long cases. The amount depends upon the ratio of service cost to income. The ratio of hospital cost to income determines the amount available for medical care, because rightly or wrongly, the hospital bill comes first. How can justice be done both to the patient and the medical attendant? What can be suggested for their mutual advantage?

Many of the profession shut their eyes to the fact that there is any problem. Yet the question is of sufficient importance to warrant investigation by a medical committee appointed by the President of the United States. It has also been the subject of a recent report by a Committee of the American College of Surgeons. You heard last month the views of the City administration as expressed by Mayor LaGuardia in no uncertain terms. We must accept conditions as they are and admit that the preponderance of opinion is that the old order of things must be changed.

Not only does a strong feeling prevail that something should be done; but it is equally clear that something will be done. The public shows a disposition to demand contract medicine under which a bureaucracy would control medical practice. It would indeed be unfortunate if, through divided counsel or inertia of the profession legislative or lay action were allowed to decide the destinies of medicine.

The profession as a whole has given too little systematized thought to the problem. On the other hand sociologists and economists have studied it extensively. Possibly there is some meat in their investigations and findings which it would profit us to digest. But from whatever sources information is gathered the profession should study the problem intensively and get the facts. That which demands change or readjustment should be admitted and plans made for its correction.

As a preliminary there should be adopted certain basic principles on which there can be little division of opinion. Can any one question that while practitioners of medicine and surgery are ready to give their services to those in need, this should be voluntary and not a matter of compulsion or legislation? No more should the State determine a doctor's fee, which is a matter for arrangement between him and his patient. On the other hand, the medical men of a community may agree among themselves as to a basis for charges. They should as complete groups in various communities try such methods as offer the greatest promise. Critically studied experiments of this nature should be carried out before a final program is proposed. Any plan should be a cooperative community organization in order that all unfair competition be avoided. The choice of physician or surgeon should rest with the patient. "This constitutes the most important factor in that relationship of trust which plays so important a part in the satisfactory conduct of medical practice." (Greenough)*

* Greenough, R. B., Presidential address, *S. G. & O.*, Dec. 1934, p. 945. Full text in later issue.

Legislation as to any method should be discouraged; such legislation would now be premature and probably impractical and laws once made are difficult to change. Moreover it would establish a degree of State control of medicine which would be highly undesirable.

The most important methods which have been suggested to distribute the costs of medical care and hospitalization on a group rather than on an individual are taxation and insurance.

Health insurance in various forms has been adopted as the most promising solution in some forty countries. In most instances it has been tried first as a voluntary plan, but this failing it has been made compulsory by legislation.

In this Country prepayment insurance to provide for the costs of hospitalization and medical care is in process of trial in several communities.

I shall refrain from discussing in further detail the plans which have been suggested and tried. It is too early to be convinced as to their merits and probably no single plan would prove satisfactory for all communities.

It may be hoped that organized medicine, under the impulse of the American Medical Association, will formulate plans for the solution of this complex problem. The Academy, unable to take the initiative, should cooperate with the purpose of upholding the interests, ideals and traditions of the profession.

I have not told you Fellows of the Academy how much I appreciate the honor of becoming your President. Words fail me. With bowed head, I quote my distinguished predecessor, "If during my incumbency of office the good work of the Academy shall have been maintained or advanced by ever so little I shall feel amply rewarded for any efforts I shall be called upon to make."

Conditions throughout the world and the nation are now as disturbing as in 1863; the words then spoken apply with equal force today. "It is for us to be here dedicated to the great task remaining before us."

DISCUSSION OF THE WORKMEN'S COMPENSATION LAW IN NEW YORK*

Its Experience And Its Implications

JUSTINE WISE TULIN

Assistant Corporation Counsel, City of New York

Twenty years ago New York State began its administration of the Workmen's Compensation Law. It is now possible to examine the experience of these years, evaluate the data that is available and draw some definite conclusions from this important social experiment.

The existence of the Workmen's Compensation Law has led to the gathering of information which has already proved valuable in the fields of safety work, labor conditions, insurance, and in the comparatively new field of the administration of labor legislation. In every aspect of the law and its administration the question of the medical treatment of injured workers has been a basic factor. Nevertheless, it has only been during the past few years that any serious attempt has been made to examine the medical procedure on which the entire administration depends.

Until twenty years ago, when a worker was injured he was left to meet the entire burden of his disability and the need for medical treatment during the time that he was disabled. The medical care was occasionally paid for by the worker but in the overwhelming majority of cases was obtained at city hospitals or free clinics where the physician gives his services without remuneration. The New York Compensation Law attempted to shift part of this burden from the individual injured worker, philanthropy and the medical profession to industry so that it might be distributed in such a way as to be absorbed by industry with a minimum of dislocation to the individual worker, his family and to society. Unfortunately the realization that it was

* Delivered at the Annual Meeting of the Academy, January 3, 1935.

necessary for organized society to provide medical care and some economic security in cases of industrial accidents did not include the corollary realization that the law or vehicle through which this was to be done need also be administered in social fashion.

The major failures and shortcomings of the law in action at the present time are due to the medical procedure which has developed. Arising out of the limitations of the law itself, these defects can only be corrected through the understanding and help of the medical profession. While many aspects of the medical procedure need correction, all of them if followed to their source derived from the fact that physicians with high professional standards have excluded themselves from and been excluded from the field of compensation practice.

Under the provision of the Workmen's Compensation Law the employer is allowed to choose the physician who treats his injured employees. A majority of employers have delegated this power to their insurance companies, who have regarded the Workmen's Compensation Law as just another business enterprise in which they must compete and gain financial profits. These companies have employed a comparatively small number of physicians, who have specialized in the field of compensation and have maintained a near-monopoly in this practice. They have regarded themselves as the employees of the insurance companies and have in turn been so regarded by the injured workers.

The business incentive of competitive insurance companies has demanded the lowest possible loss ratio which is dependent primarily on the number of claims defeated and limited. The pressure to secure physicians adaptable to a favorable and legalistic point of view has therefore so colored the selection, that it has undermined the standards of the profession in this field and made the work distasteful to physicians who became aware of the situation. Other factors including cutthroat competition between physicians, the low standards of commercial clinics, and the

increasing chiseling on medical bills by carriers has added to the poor repute of this work.

The State Insurance Fund, although a non-profit making state organization, has apparently considered itself in competition with the private companies to such an extent that it has adopted these same devices, and failed to raise the standards of medical practice.

The control of the selection of physicians has been seriously abused by the carriers who have looked upon this selection as the means with which to control medical testimony. Because of increasing criticism, Governor Roosevelt appointed a Committee to investigate the medical costs of the Compensation Law under the Chairmanship of Howard Cullman in 1932. The report of this Committee completed after a year's survey showed that the testimony of physicians in regard to the causal relationship between an accident and subsequent disability and also in regard to the extent of disability was closely correlated to the economic interests of those who employed them. In those cases where the injured employee finally secured a physician of his own choosing the physician was apparently employed primarily to offset the testimony of the carrier's physician and a crude battle between opposing experts resulted. This study was based on a fair cross-section of seriously controverted cases and therefore significantly illustrates the demoralizing effect of the present procedure both on those members of the medical profession who have been employed in it and on the administration of the law itself.

Employer and insurance company control of the selection of physicians has been further abused through using this power as a means of getting injured workers back to work too soon. Physicians under the law are required to get an authorization for treatment from employers in order to secure payment of their bills. In practice the employees are, therefore, unable to secure independent medical aid, even though the facts may subsequently warrant an award for reimbursement because the authorization was unreasonably withheld or because only inadequate treatment was authorized.

The importance to the employee of securing such independent medical aid is evidenced by the fact that in a large proportion of cases the State Examiner finds disability after the carrier's physician has ordered an injured employee to resume his regular work and has advised the stoppage of compensation benefits. A few years ago the State Department of Labor conducted an unannounced examination of all injured employees who appeared at the information room and complained that the employers or carriers refused to give them further treatment. The medical examination conducted by the assistant to the chief medical examiner of the State, showed that further treatment was necessary in over 50 per cent of the cases.

The facts thus show that under the present procedure physicians have too frequently been used not to render adequate treatment, but to cut down the costs to the employer by underestimating periods of disability and rendering biased medical testimony on the questions of causal relationship and the extent of disability. This situation has led to such suspicion and hostility by injured employees that the essential relationship between physician and patient has been seriously undermined if not entirely lost in compensation practice.

The insurance companies have justified their insistence on controlling the choice of physicians on the ground that it is only through such control that they can keep down medical costs. But the facts do not support this claim. Medical control by insurance companies has been used to limit the benefits paid to injured workers rather than to keep down medical costs. Answers to a questionnaire sent out by the Commissioner of Insurance to carriers of workmen's compensation in 1933 showed that there was a comparatively slight correlation between the degree of medical control exercised by a company and the average cost of medical treatment. Padded bills and fee splitting have been permitted to flourish under this control system. The choice of physicians by private companies has resulted in fixed forms of business patronage. Where the employer or insurance company is a political unit there has been an added

element of political patronage, but the practices have been similar.

The report of Governor Roosevelt's Committee set forth many of these problems and recommended that a panel of qualified physicians should be established from which injured employees could choose who was to treat them. The Committee also recommended that organized medicine should take the responsibility for establishing panels of qualified physicians and removing any physicians who failed to meet reasonable standards of workmanship and ethical practice.

The report and recommendations of this Committee were referred by Governor Lehman to a second committee of distinguished physicians under the Chairmanship of Dr. Eugene H. Pool. That Committee again studied this entire question for almost a year and early in 1934 made definite recommendations to Governor Lehman for the amendment of the Workmen's Compensation Law in regard to its medical procedure. Those recommendations were incorporated in a bill introduced in Albany last winter but buried in committee. That bill has been revised this year and is now in the hands of the Industrial Commissioner for study by him.

The bill provides that organized medicine throughout the State shall recommend both general physicians and specialists who are able and willing to do compensation work for panel service, and that those physicians in turn shall agree to do only work for which they are qualified. Injured employees in the State of New York will be permitted to go to any general practitioner on the panel thus created, with the safeguard to the employer that he may require a check-up examination at reasonable intervals by a physician of his own choice. Some additional restrictions will be placed on the employment of specialists. Through additional check-ups by the Department of Labor unduly prolonged treatment will be avoided, and at the same time the incentive to deprive workers of necessary treatment will be curtailed. The bill further provides that physicians who do compensation work shall be paid minimum fees which are

to be fixed by the Commissioner in consultation with representatives of organized medicine. This provision, together with one for the arbitration of disputed bills, is intended to end cutthroat competition and encourage a better group of physicians to engage in compensation practice. The administration of the medical aspects of the law will be under the supervision of an enlarged Industrial Council, appointed by the Commissioner, and to be composed of five representatives of the employers, five representatives of the workers, and five physicians representing organized medicine. The additional duty and power imposed on both the Commissioner and organized medicine to investigate charges of misconduct by physicians on the panel and to remove physicians found guilty of conduct in violation of the standards set by the law supplies the machinery necessary to end the costly corruption which has developed under the present administration.

New York City is a self-insurer which employs approximately 140,000 men and women who are covered by the Workmen's Compensation Law of this State. The new City administration decided as soon as it took office to put into effect the recommendations of the Governor's Committees as far as possible without waiting for State legislation.

On taking office the City Administration found a system under which the Corporation Counsel's Office had because of political pressure given the major portion of its medical work to a few favored physicians without regard for either the standard of the medical care rendered or the medical cost involved to the taxpayers of the City. Under this system the medical costs had mounted steadily from 1926 through 1933, and had absorbed an increasing percentage of the total compensation costs, so that in the year 1933 the money paid to physicians together with the bills incurred but not paid totaled \$596,000.00 and constituted 45 per cent of the City's total compensation bill. During the same period the portion of the total compensation bill paid to injured city employees had steadily declined from 87 to 55 per cent. The medical bills of hospitals and physicians without political power were neglected to such an extent

that the new administration inherited \$322,000 of unpaid medical bills, some dating back as far as 1925.

Under the new administration the Workmen's Compensation Division has created a city-wide panel of general practitioners who are used according to location. This panel is composed of physicians recommended by the Medical Boards of the 98 hospitals in New York City fully approved by the American College of Surgeons and subsequently submitted to the County Medical Societies for their investigation. In addition, this Division, with the aid of its Medical Advisory Board, has created a panel of 100 outstanding specialists in New York City to whom it sends difficult cases for diagnosis and for treatment. This Board is composed of Dr. John L. Rice, Dr. Bernard Sachs, Dr. S. S. Goldwater, Dr. Eugene H. Pool and Dr. George Baehr.

As soon as an employee is injured he is referred by his Department to the Corporation Counsel's Office for examination by one of the medical experts attached to the Workmen's Compensation Division. If medical treatment is indicated he is permitted to go to his family physician subject to supervision by a medical expert. In cases in which an employee either has no family physician or does not care to go to his family physician he is referred to the panel physician nearest to his home.

This procedure based on allowing employees free choice of physicians subject to medical supervision has already shown definite gains. A far happier relation between the city and its employees as well as between the injured employees and their physicians has resulted. Medical service of high calibre has been made available to the injured city employees. And finally the cost of medical treatment, in spite of dire predictions to the contrary, has been reduced to such an extent that it proves without question the financial waste and corruption which flourished under the old system. The current medical costs for the year 1934 were a little under \$105,000.00, and represented less than 15 per cent of the total compensation bill as compared with 45 per cent in 1933. The work of the City can only be regarded as an

experimental effort even in the field of compensation. It has, however, already shown that the free choice of physicians by injured employees, if administered in cooperation with organized medicine, will lead to improved standards of medical treatment. This has been true in the City which is not subject to the pressure of business competition. Such procedure is even more necessary to improve the standards of medical treatment where the insurance carrier is subject to the additional inducement to keep the cost of compensation payments down by curtailing medical treatment, returning employees to work prematurely, and by producing medical testimony which will permit it to avoid or limit liability.

During the past year whenever the questions of health insurance, group medicine, or the socialization of medicine have been considered, physicians have been prompt to voice their fear of the influence of political patronage and corruption on the medical profession. It is certainly true that neither the State nor private commercial institutions can purge their administrative work of political and business patronage without the cooperation of organized medicine. It is equally true that no broad or adequate social health program can be achieved without that same support. The Workmen's Compensation Law has clearly shown this.

The Workmen's Compensation Law as an important social experiment has broad implications for all of us. Through it society for the first time provided for the regular medical care or medical security of a limited part of the population under special circumstances. This legislation was enacted to meet the mounting and comparatively new hazard of industrial accidents. Since its enactment other and greater hazards have emerged to lessen the security of men and women, and to make it impossible for them as individuals to obtain adequate medical care for themselves and their families.

At the present time there are over eleven million unemployed men and women in this country. In addition there are millions more who are either partially employed or

employed at so bare a subsistence level that they cannot secure the necessities of life for themselves and their families. This means that there are probably from forty to fifty million human beings who cannot purchase adequate medical service. You know far better than I how much that is not now done could be done by physicians to heal the sick and to prevent illness. On the one side of the picture we see millions of human beings needing medical service and needing it not only for themselves but for the sake of the community of which they are a part. On the other side we see thousands of physicians unable to secure work, unable to establish themselves in practice, unable to maintain homes, forced on relief, and finally deprived of the opportunity to practice their science and mature in their profession.

Frequently physicians admit that the socialization of medicine may be necessary in order to secure proper medical treatment for the great mass of people, but object to having medicine singled out as the first field for socialization. They maintain that if our economic system is to be socialized they have no objection to going along with the general movement, but see no reason why they should be the first to surrender the rights and privileges of private enterprise.

I can understand the objection of physicians who do not wish to become social guinea pigs, who object to being experimented with and who resent any plan which provides for the socialization of medicine before the other aspects of life are socialized. But physicians are dealing more directly with human life than any other group in society. They must be clearly aware of the unnecessary suffering which results when a society is permitted to develop in such a way that those who can render medical aid and those who need such aid are not brought together. Physicians constitute an old profession which from earliest days set for themselves far higher ideals than those recognized by men engaged in commerce. It is true that those ideals have become tarnished and shopworn and that under the stress of modern competitive society old standards have too often been yielded to new expedients.

It is clear that in modern society physicians are entitled to demand two things. They are entitled to demand a reasonable amount of economic security, and they are entitled to demand a field in which they can function fully as men and women with expert training. Society in turn has a right to demand from this expert group the maximum of health service consistent with these two rights. As physicians you have seen the dire consequences of not planning our society in such a way that the resources of your profession are fully utilized. You have seen the physical and psychic breakdown of families deprived of adequate medical care. You have seen fellow-physicians who have rendered years of service lose their homes and all opportunity to practice medicine because their patients became unemployed. You have seen young men eager and able to do great work in your profession, deprived of the equipment with which to study and the opportunities for practice, necessary to growth. It is not too much to ask that your profession with its traditions, with its awareness of human suffering and with its capacity for service shall lead the way in working out a planned society in which the service which you can render will be placed fully at the disposal of the whole community.



MEDICAL CARE AND HOSPITALIZATION OF THE INDIGENT SICK*

HON. HERBERT BROWNELL, JR.
Member, New York State Assembly

It may be accepted as a fact that there exists among the public a considerable amount of dissatisfaction in regard to the present system of medical practice. This dissatisfaction does not imply any criticism of the medical profession. Indeed, it is the very reverse because it grows out of an appreciation of medicine and a desire to profit more fully by what medicine has to offer for the benefit of mankind.

The cause of dissatisfaction is an economic one. The real problem arises out of the inability to pay for such medical services as are required. Under the present social structure there are large classes of the population that cannot pay for adequate medical care and consequently are going without it. This is the case in spite of the fact that members of the medical profession furnish medical care for the indigent largely without remuneration.

Persons who have only a vague notion of the problem and who are largely unacquainted with the medical aspects of it are often heard to say that the cure for this unsatisfactory condition is "Socialized Medicine" or "State Medicine." Indeed so many schemes which are economically unsound or defective from a medical point of view have been advanced under the names "Socialized Medicine" or "State Medicine" that the medical profession as a whole has a distinctly unfavorable reaction when any change in the present system of medical practice is advanced.

This is unfortunate from every standpoint. While this "stand-off" attitude prevails, steps are being taken without full consultation with or approval of organized medicine which may bring about drastic changes in the system of medical practice. The medical profession must take the

* Delivered at the Annual Meeting of the Academy, January 3, 1935.

lead in passing upon the advisability of these changes or else unsound legislation will be passed and standards of practice distinctly detrimental to the profession will be established.

It is my purpose to outline some of the changes in the belief that once you recognize their imminence and their import, you will use your influence to have the medical profession take the lead in co-ordinating these changes into a unified plan which is socially desirable and consonant with the highest standards of the medical profession. Some of the changes I believe you will find undesirable; others you will want to encourage and develop.

The first change in our system of medical practice that comes to mind is the development of the medical and nursing service of the Home Relief Department. The Emergency Relief Act of the State of New York defines "medical care" as one of the necessities of life to be provided to all persons who are found to be in dire want owing to the economic depression. How is the medical care provided in New York City?

Any person receiving home relief who believes himself to be in need of medical attendance, or medicine, by calling Home Relief headquarters, may have a doctor immediately dispatched to his home without incurring any financial obligation. There are 2811 doctors now employed by Home Relief to give such medical care at \$2 a visit—2811 "contract doctors." That fact alone should startle us into a realization that new standards of medical practice may be developing almost without the knowledge of the organized medical profession. Any practitioner licensed to practice, who is not shown to be in bad standing in his neighborhood, may have his name placed on the reserve panel to answer these home relief calls, by filling a simple application. So far as I can find out no effort is made to determine the type of practice or length of experience of the applicant doctors, either at the time their applications are accepted or wh

come in, the doctors on the panels are assigned in rotation, although the regulations provide that if a patient so requests, and the relief authorities find it practicable, the "family doctor" will be sent. "Family doctor" is defined as a practitioner who has treated the patient prior to the date when the patient went on the home relief rolls. The doctors on the panel are allowed to continue their private practice, and they may reject any home relief call.

The "contract doctor" is allowed to make up to 5 calls upon the patient at his home without further authority from the relief officials, charging the Relief Administration at the \$2 rate—or a total of \$10. If further calls are required, or if he thinks a nurse is needed, or that hospitalization is indicated he informs relief headquarters and they decide whether his request shall be carried out. If they approve the suggestion that a nurse be sent, the visiting nurse association which serves the neighborhood where the patient lives, is called. For each visit the "contract nurse" receives \$1.00. I understand that the nursing organizations contend that when a home relief call for medical care is received, a nurse should first be sent, and she should recommend whether a doctor is needed—rather than having the doctor call first and determine whether a nurse is needed. The doctor also recommends whether medicine is needed and if the relief administration officials approve the request, they authorize one of the pharmacies on their approved list to fill the prescription. These medicines are charged for at a fixed price agreed upon in advance between the pharmacists and the relief officials. No contribution is made out of home relief funds to the doctors connected with hospitals for the hospital services they render to home relief patients. The government expects the doctors to continue their wonderful record of hospital care of the indigent sick of New York on a charity basis.

Over 900 home relief calls are answered on some days, and the scope of the service is increasing more rapidly than any other relief division as the persons on home relief learn about it. During November the service here in New York City cost approximately \$92,000 for doctors and nurses and

for medical supplies. If the salaries of the office staff of the service be included, the November cost was about \$150,000, or at the rate of \$1,800,000 per annum.

The public unemployment relief work has a second department of more than passing interest to the members of the medical profession. This is the so-called Disability Division of the Work Relief Department. In this division are treated all the accidents and sicknesses of the persons engaged on public works' projects. There are only 34 doctors employed here. But an entirely different method is followed. The doctors in the Disability Division are on a salary ranging from \$27 a week to \$40 a week, or at an annual rate of \$1,404 to \$2,080. These practitioners punch the time clock, to all practical purposes. They are employed to work from 9 A.M. to 5 P.M., and timekeepers are hired to see that they keep these hours. These doctors are allowed to continue private practice in the evenings, except that they are not allowed to take patients who are receiving medical attention from the work relief department. The doctors so employed are chosen primarily from lists submitted by the local medical societies, although any other doctor is eligible to apply to be placed on the panel. The financial want of the applicant is considered, but the controlling factor is stated to be the applicant's "efficiency." If the doctor in any case recommends that medicine be given the patient, or that hospital treatment is required, these requests are passed upon by the medical head of the Disability Division. The reports of the Disability Division for the month of October show that the salaries of the doctors totalled \$4,480, whereas if the professional services had been rendered on the flat \$2 fee plan, the cost would have been about three times as much, or \$12,878.28.

It will be noticed that no money is paid out of home or work relief funds to voluntary hospitals to reimburse them for care of the patients. It is true that the City contributes almost 15 millions of dollars out of its general fund to private hospitals and private charitable institutions to aid their budgets. Yet even with this public aid, we realize that

voluntary hospital budgets do not balance today. Private charity can no longer carry the load. Experience in England during the past ten years and in this country during the last four years, has demonstrated that it is practicable to balance these hospital budgets by providing hospital care for the wage earner and low salaried worker on a pay basis rather than a charity basis, provided the payments are small and a large group co-operates in spreading the risk of hospital expense.

A year ago a group of hospital presidents and the Hospital Conference of the City of New York, made up of the superintendents of 73 New York hospitals, formally requested the United Hospital Fund to appoint a committee to develop, if possible, such a plan for New York City. The plan has been developed, approved by the State Superintendent of Social Welfare, and is about to be actively promoted. A non-profit corporation is to be established, known as the Associated Hospital Service of New York. The affairs of the corporation will be controlled by eleven directors, elected annually by a voting membership comprising the presidents of the Hospital Conference of the City of New York, the Brooklyn Hospital Council, the five County Medical Societies of Greater New York and the Medical Society of the State of New York, and the trustees of the United Hospital Fund. Every voluntary hospital in New York City and the Metropolitan Area meeting the standards of the American College of Surgeons will be eligible to membership, and certain proprietary hospitals maintaining equal standards may be eligible to participate, if approved by the State Department of Social Welfare.

The Associated Hospital Service of New York will undertake the solicitation of annual subscriptions among employed groups, arranging with employers and employees for payroll deductions. The cost to subscribers will be 90c. per month or \$10 per year. Such subscriptions will apply to employed persons only and not to their dependents, although dependents may be included later as the plan develops.

A subscription will entitle the subscriber to three weeks of "semi-private" hospital care during the contract year after a ten day waiting period immediately following the signing of the contract (except in case of accident in which case the waiting period would not apply), and a ten month waiting period for obstetrical cases. Admission to the hospital will be granted only on the recommendation of the subscriber's personal physician. The patient will be subject to the regular rules of the hospital and would make his own arrangements with his physician in respect to fees for medical service. The Associated Hospital Service of New York will reimburse the hospital members at a flat rate per day probably six and possibly seven dollars per day.

In addition to so-called "group hospital" plans, such as the one just described for New York City, there has been a rapid development in this country during the past few years of various plans for group medical service. I have time to mention only one type of many that are being tried. Fifty-five surgeons and physicians in the Los Angeles area have united in a profit-making plan whereby at the present time over 12,000 persons pay \$2 per month and receive in return complete medical and surgical attention, including diagnosis, clinical or laboratory tests, x-ray examinations, treatments, operations, professional consultations and visits. Also, the subscribers are entitled to receive without charge all medicines prescribed by the medical attendants, with minor exceptions. Also hospitalization, where such treatment is prescribed by the medical attendant, providing the period of stay shall not be more than three months in any one year. No dental service is included. Dependents in the family of the subscriber also receive certain free medical services, and reduced rates on all treatments and consultations.

This profit-making group plan is being bitterly opposed by the State and County medical societies where it is being carried on. The two practitioners who conduct the service have been expelled from the local society and thus have lost their membership in the American Medical Association.

There is some talk of excluding them from hospitals of recognized standing. The opposition of the medical societies is based on the theory that the plan destroys the personal relationship of doctor and patient; also that it will surely lead to competitive profit-making groups, and eventually to price-cutting and unethical practices between rival profit-making groups.

The fifth and last development to which I wish to refer is the recently announced plan of the Canadian Medical Association for a comprehensive system of compulsory health insurance for Canada. The Association represents the entire medical profession of Canada, and its findings represent the result of studies carried on since 1929. While many practitioners did not approve of health insurance, they were willing to have the Association develop a plan because of the unfortunate results experienced in other countries where health insurance legislation was adopted without consultation with organized medicine.

The stated purpose of the Canadian health insurance plan is to make available for every person in Canada the full benefits of curative and preventive medicine irrespective of the ability of the individual to pay for it; and at the same time to insure the practitioners of medicine and others associated in providing medical care, a reasonable remuneration for their services. All persons with dependents who have an annual income of less than \$2,500, and all persons without dependents having an annual income of \$1,200 or less, and all indigents, together with dependents of all the classes set forth above, are the persons to be included in the Canadian plan.

Wage earners and salaried employees included in the insured classes, are to have a small tax or contribution deducted each week from their wages or salaries. Rural land owners contribute by paying a land tax; for rural non-land owners and urban employers, a poll tax is provided. Employers are also to contribute, on the theory that they have a direct interest in the physical and medical health of their employees. The State is also asked to make

a contribution on behalf of the indigent. Every insured person, including the indigents, is to be entitled to specialist and consultant medical service, visiting nurse service in the home, certain hospital care, pharmaceutical service and dental service.

Under the plan every qualified licensed practitioner will be entitled to practice. When a person becomes sick he will go to the doctor of his own choice in his local community and receive the medical care referred to above. There is to be no supervision by the State or by the administrators of the health insurance plan as to what doctor should be chosen. The doctor receives his pay from the insurance fund. The method of payment will vary according to the type of community. In those areas where there is not sufficient population to maintain even one general practitioner he will be paid a regular salary. In other areas the method of payment will be decided upon by the practitioners in that area. They might be paid a flat amount per year for each insured person who comes to them for professional services; or there might be a rate set by the local medical society for each particular medical act. The local medical society would also determine the fees for specialist's and surgical acts. There would be no cash payments under the plan and no attempt to compensate for loss of wages during the period of illness.

The health insurance would not interfere in any way with the continuation of public health services, such as collection of vital statistics, control of communicable diseases, tuberculosis sanatoria, mental hospitals and school health services.

These five plans which I have discussed justify, I believe, the statement I made earlier: that many sweeping changes are being made and others are about to be made in our community in the system of medical practice. Politicians will continue to present new plans as long as there continues to be widespread dissatisfaction with the present system. We must insist that the plans shall be sound from a medical standpoint before any are adopted, otherwise

they cannot be successful. Because of the prejudice against the terms "State Medicine" and "Socialized Medicine," and the uncertainty as to their meaning, I think they should not be used to denominate any of the proposed new plans. Let each plan be considered on its merits regardless of the name by which it is described. My own conclusion is that the most orderly way to proceed in New York State is for organized medicine to make an immediate study and suggest changes in our public health program. Such a study would be of decisive importance to the State, and might well serve to prevent enactment of ill-advised legislation.

PRESENTATION OF THE ACADEMY MEDAL
TO DR. CHARLES NORRIS

Stated Meeting of The New York Academy of Medicine
Held December 6, 1934

Dr. James Ewing who introduced Dr. Norris said:
Mr. President:

I have the honor of presenting to you as most worthy of the Medal of The New York Academy of Medicine, one who is, first of all, a gentleman and a loyal friend, a man endowed with strong mind of judicial cast, a scholar of high attainments, trained in the sciences of pathology and bacteriology in each of which he has made substantial contributions, whose chief distinction lies in providing the City of New York, for the first time in its history and against many difficulties, with a sound medico-legal organization, thereby placing this community and all its citizens as well as the medical profession under lasting obligation, the first Chief Medical Examiner of the City of New York, Dr. Charles Norris.

REPORT ON THE
SEVENTH ANNUAL GRADUATE FORTNIGHT
Publicity

22,000 copies of the preliminary announcement were printed and distributed. Requests received for copies of the complete program numbered 4,474. Of the complete program 9,000 were printed and about 5,000 were distributed by mail. Reading notices in the form of releases to the number of 213 were sent to medical journals, county societies, national societies, A. M. A. sections and a miscellaneous list. A paid advertisement appeared in the A. M. A. of September 16.

Registration and Ticket Distribution

Registration began early and very soon it became evident that the registration of last year (643) would be exceeded. The regular sale of tickets was stopped when the number sold had reached 700. Fellows and Members of the Academy were issued tickets without charge as were speakers at evening meetings, clinicians and exhibitors, and also about one-third of the residents and interns in important city hospitals.

Attendance

Attendance at evening meetings exceeded that of any previous Graduate Fortnight. For the first week it averaged 900 and for the second week 840. The smallest attendance was 475. About 1,400 persons tried to hear the papers presented on the evening of October 29 (County Society Meeting). For that evening a loud speaker was installed in a section room on the second floor to accommodate those who could not be admitted to Hosack Hall.

All afternoon clinics were well attended, in some places taxing the seating capacity of the auditorium.

Scientific Exhibit

It has been the main purpose of the Committee to keep the Scientific Exhibit on the same high plane as the previous exhibits of the Graduate Fortnight.

There were over 110 individual exhibitors this year, which greatly exceeds any previous Fortnight. There were more anatomical specimens on display and the number of x-ray exhibits was almost twice as large as shown in previous years. The construction of a new type of illuminating box by the Academy's staff should cover this exhibit in a better manner than heretofore.

From an artistic viewpoint the exhibit was better housed than the previous ones, but the rooms accessible for exhibit purposes in the Academy are by no means satisfactory.

It was constantly borne in mind by the Committee that it is impossible for a Committee to be too autocratic and that individual exhibitors must be satisfied. This always means the construction at the last minute of special equipment, lighting fixtures, the changing of signs, etc.

Experience leads to the conclusion that this year's Scientific Exhibit has reached a limit in size, and that it is quite impossible to properly house a larger exhibit in the rooms now available for exhibit purposes. It would seem, therefore, that certain recommendations and suggestions could properly be made at this time as a basis for future presentations.

1. Housing of Scientific Exhibits.

It is believed that in the future the following rooms should be set aside for exhibit purposes:—on the first floor, the small reception room (to be used for book and historical exhibits); the collation room (which houses the largest number of exhibits and is the only room really suitable for exhibit purposes); the main corridor with its stairway; the exhibition room directly in the rear of Hosack Hall, and on the first floor; the corridor of the second floor; room 21 on

the second floor (from which all seats and the concrete platform should be removed); room 20 (a section room on the second floor which should be converted into a large exhibit hall by the removal of all seats); and four accessory, small rooms adjacent to room 20.

If these rooms were turned over for exhibit purposes they would amply take care of all future exhibits not greatly exceeding the last one in size.

2. Demonstration of Exhibits.

The success of an exhibit depends upon its personal demonstration by an exhibitor. Doctors will frequently walk past an exhibit which is not being demonstrated.

Physicians arrive at the Academy in greatest numbers after 7:30 p.m. and remain for the evening lectures, a considerable number staying after the evening lectures to again visit the exhibits.

Exhibitors, therefore, should be at their booths from 7:30 p.m. until at least 11:30 p.m. and should constantly demonstrate their exhibits during this period. No special demonstration should be posted, as the number of exhibitors is too large and the selection of a few for special demonstrations evokes criticism.

3. Pooling of Exhibits.

A suggestion has been made that many of the hospitals should merge their exhibits instead of displaying them as individual exhibits; that specimens should be pooled, with due individual credit to each hospital written over each specimen, etc. By such a procedure, the lesions could be properly grouped in anatomical order or according to systems and much undesirable repetition avoided.

Such a suggestion is by no means new. In the Cancer Fortnight, Dr. Ewing and Dr. Martland planned to adopt this method and to show specimens of cancer from various

hospitals grouped according to organs or systems. Most of the institutions, however, did not wish to pool their material, preferring to enter it as individual exhibits and so it became necessary to give up the idea or to have a small exhibit only.

Such a procedure in a permanent exhibit is of course ideal, where a careful selection of material and proper help and time are possible.

4. Special Demonstrations.

When there are about 100 individual exhibitors it is practically impossible to select a small number of special demonstrations without arousing the feelings of other exhibitors.

5. Special Programs Preceding Evening Lectures.

In the past special programs have been given of fresh pathology, clinical cases, etc., lasting for an hour before the evening lectures begin. This, of course, draws the crowd from the exhibits at the best time. Therefore, it is recommended that these special programs be given directly after the evening lectures, the subjects being announced from the platform.

6. Book Exhibit.

The housing of the book exhibit in the small reception room made this very important exhibit easily accessible and added dignity and culture to the exhibit.

7. Commercial Exhibits.

In the Fortnight on Metabolic Diseases and in this Fortnight a few commercial firms were invited to illustrate the subject by the display of drugs, pharmaceuticals, etc.

The firms were instructed to make their exhibits purely scientific and to do no advertising, no signing of books of attendance, no handing out of pamphlets, etc.

In the Metabolic Fortnight such exhibits were entered under the names of professional men connected with the research laboratories of such firms. Only drugs accepted by the Council on Pharmacy and Chemistry of the A. M. A. were allowed to be displayed.

8. Photographs.

During the last two Fortnights photographs were taken showing the main rooms and their appearance. The Academy has available, therefore, pictures showing the main set-up of the rooms during these Fortnights. These should be kept for historical purposes.

REGISTRATION FOR 1934 GRADUATE FORTNIGHT

(Total 709)

New York State, 518

Manhattan	271	Queens	21
Brooklyn	76	Richmond	.. 2
Bronx	90		
New York commuting area (25-mile radius)		..	13
Up-State New York			45

New Jersey, 104

Commuting area (25-mile radius)	99
Other parts	..... 5

Thirty Other States and Countries, 87

Arkansas	1	North Carolina	2
California	2	Ohio	10
Connecticut	10	Pennsylvania	15
District of Columbia	2	Rhode Island	1
Florida	2	Tennessee	2
Illinois	2	Texas	2
Indiana	4	Utah	3
Iowa	1	Virginia	1
Maryland	1	Washington	1
Massachusetts	2	West Virginia	2
Michigan	1	Wisconsin	4
Minnesota	1		—
Mississippi	1	Puerto Rico	1
Missouri	4	Canada	5
Montana	2	Cuba	1
		Holland	1

Attendance at Afternoon Clinics

<i>First Week</i>		<i>Second Week</i>	
October 22		October 29	
Bellevue	225	Bellevue	50
Beth Israel	125	Beth Israel	200
October 23		October 30	
Fifth Avenue	175	Fifth Avenue	76
Mount Sinai	168	Mount Sinai	276
October 24		October 31	
Lenox Hill	149	Lenox Hill	116
Post-Graduate	165	Post-Graduate	140
October 25		November 1	
Babies'	55	Polyclinic	175
Memorial	101	Presbyterian	50
St. Luke's	93	St. Luke's	75
October 26		November 2	
Flower	140	Roosevelt	70
Montefiore	182	St. Vincent's	200
New York	75		

RECENT ACCESSIONS TO THE LIBRARY

- Alexander, G. F. Ocular dioptrics and lenses.
London, Baillière, 1934, 216 p.
- Ariëns Kappers, C. U. An introduction to the anthropology of the Near East.
Amsterdam, N. V. Noord-Hollandsche uitgeversmaatschapij, 1934,
200 p.
- Asherson, N. Acute otitis and mastoiditis in general practice.
London, Lewis, 1934, 317 p.
- Bouman, L. Diffuse sclerosis.
Bristol, Wright, 1934, 160 p.
- Burrard, G. The identification of firearms and forensic ballistics.
London, Jenkins, [1934], 220 p.
- Dandy, W. E. Benign, encapsulated tumors in the lateral ventricles of the brain.
Balt., Williams, 1934, 189 p.
- Davies, H. W. Practical x-ray therapy.
London, Churchill, 1934, 134 p.
- Duke-Elder, (Sir) W. S. Recent advances in ophthalmology. 3. ed.
London, Churchill, 1934, 434 p.
- Fischer, E. & Lehnartz, E. Lehrbuch der Physiologie für Studierende der Zahnheilkunde.
Berlin, Springer, 1934, 202 p.
- Gundel, M. Die Typenlehre in der Mikrobiologie.
Jena, Fischer, 1934, 192 p.
- Haggard, H. W. The doctor in history.
New Haven, Yale Univ. Press, 1934, 399 p.
- Hitchcock, D. I. Physical chemistry for students of biology and medicine.
2. ed.
Springfield, Ill., Thomas, 1934, 214 p.
- von Hoesslin, R. Über multiple Sklerose.
München, Lehmann, 1934, 109 p.
- Kolle, W. & Hetsch, H. K. W. Experimental bacteriology in its application to the diagnosis, epidemiology, and immunology of infectious diseases.
London, Allen, [1934], v. 1.
- Krecke, A. The doctor and his patients.
London, Paul, 1934, 301 p.
- Loewenthal, M. S. Life and soul.
London, Allen, [1934], 291 p.
- Martínez, M. Las plantas medicinales de Mexico.
Mexico, Botas, 1933, 644 p.
- Meldrum, N. U. Cellular respiration.
London, Methuen, [1934], 116 p.

- Mexico (Rep.). Departamento de Salubridad Publica. Primer censo del mal del pinto en la Republica Mexicana, 1929-1931.
 Mexico, Dept. de Salubridad Publica, 1931, 171 p.
- Moon, R. O. Medicine and mysticism.
 London, Longmans, 1931, 57 p.
- Parsons, W. The circulation of the blood.
 London, Sheldon, [1931], 204 p.
- Rabin, C. B. A textbook of pathology for nurses
 Phil., Saunders, 1931, 213 p.
- Reichborn-Kjennerud, I. Über die Mechanik des Durchbruches der bleibenden Zahne beim Menschen
 Berlin, Meusser, 1931, 178 p
- Reiss, M. Die Hormonforschung und ihre Methoden
 Berlin, Urban, 1931, 415 p
- Schafer, (Sir) E. A. S. Essentials of histology. 13. ed
 London, Longmans, 1931, 618 p.
- Schinz, H. R. & Buschke, F. Krebs and Vererbung
 Leipzig, Thieme, 1935 [1931], 280 p
- Thoma, K. H. Clinical pathology of the jaws
 Springfield, Ill., Thomas, [1931], 643 p
- Wildholz, H. Lehrbuch der Urologie. 2 Aufl.
 Berlin, Springer, 1931, 645 p
- Wilkinson, F. & Forty, F. J. Swimming bath water purification from the public health standpoint. [2. ed.].
 London, Contractors' Record, [1931], 264 p.
- Willis, W. A. The workmen's compensation acts 1925 to 1931 29 ed
 London, Butterworth, 1931, 905 p
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PROCEEDINGS OF ACADEMY MEETINGS DECEMBER

STATED MEETINGS

December 6

- I. EXECUTIVE SESSION—a Reading of the Minutes; b. Presentation of Academy Medal to Dr. Charles Norris; c. Election of Academy Officers
- II. *The Eighty-eighth Anniversary Discourse was delivered by HON. FIORELLO H. LAGUARDIA on the subject "THE MEDICAL PROFESSION IN THE NEW AGE"*

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

December 20

THE THIRD HARVEY LECTURE, "The Present Geographical Distribution of Yellow Fever and its Significance," Wilbur A. Sawyer, Associate Director, International Health Division, The Rockefeller Foundation.

SECTION MEETINGS

SECTION OF DERMATOLOGY AND SYPHILIOLOGY—December 4

I. PRESENTATION OF CASES FROM NEW YORK POST-GRADUATE MEDICAL SCHOOL.

II. DISCUSSION OF SELECTED CASES.

III. EXECUTIVE SESSION—Examination of cases is limited to members and their invited guests.

JOINT MEETING—SECTION OF SURGERY and SECTION OF MEDICINE—December 7

I. PAPERS OF THE EVENING—a. The medical treatment of pulmonary tuberculosis, James Alexander Miller; b. The applicability of surgical operations to tuberculous lesions of the lung, Adrian V. S. Lambert.

II. DISCUSSION—James B. Amberson, Jr., Frank B. Berry.

III. In addition to the regular program Dr. Shepard Krech presented the problem of acute appendicitis in New York City with a plan for its further study.

SECTION OF NEUROLOGY AND PSYCHIATRY—December 11

I. PRESENTATION OF CASES—a. Visual disturbances after carbon monoxide poisoning, Milton Abeles (by invitation); b. Charcot-Marie-Tooth disease with optic atrophy, Daniel Schneider (by invitation); c. Clinical pathological presentation. Encephalitis complicating pneumoconiosis, Irving J. Sands.

II. PAPERS OF THE EVENING—a. Lipolytic blood properties in multiple sclerosis; their use in determining presumptive activity of the disease, Richard Brickner; b. A serological complement-fixation test for multiple sclerosis, Gabriel Steiner, Department of Psychiatry and Neurology, Heidelberg University (by invitation); c. The pathogenesis of multiple sclerosis, Tracy J. Putnam, Department of Neurology, Harvard University (by invitation); d. Metallic retention as a quantitative variant in diseases of the nervous system determined by biospectrometric analysis, L. Edward Gaul (by invitation), Rollo Masselink (by invitation), A. H. Stoud, B.S. (by invitation).

III. DISCUSSION—Colin K. Russel, Montreal Neurological Institute, McGill University (by invitation).

SECTION OF PEDIATRICS—December 13

I. READING OF THE MINUTES.

II. PAPERS OF THE EVENING—*Psychological care during early childhood from the standpoint of the pediatrician*—a. Intelligence testing, John Levy (by invitation); b. Habit training, Lawson G. Lowrey; c. Emotional behavior, Ira S. Wile.

III. GENERAL DISCUSSION—Elmer Johnson, Herbert B. Wilcox.

SECTION OF OPHTHALMOLOGY—December 17

I. INSTRUCTION HOUR, 7 to 8 o'clock—Slit lamp microscopy, a. Instruments; b. Illumination, Milton L. Berliner, Wendell L. Hughes.

II. DEMONSTRATION HOUR, 7:30 to 8:30 o'clock—Case examinations; Slit lamp studies, Milton L. Berliner, Isadore Goldstein, Wendell L. Hughes, Girolamo Bonaccolto, Gordon M. Bruce; Slit lamp instruments.

III. SECTION MEETING, 8:30 to 10:30 o'clock—a. Reading of the minutes; b. Remarks: Carl Koller and cocaine in ophthalmology; c. Case reports: 2 cases of keratitis numularis (Dimmer), Herman Elwyn; d. Scientific papers: 1. Some factors in the practical application of theoretically correct ophthalmic lenses, Alfred Cowan, Philadelphia (by invitation), Discussion, LeGrand H. Hardy; 2. The traumatic ophthalmoplegias as a workman's compensation problem (with lantern slides), Mark Davidson (by invitation); 3. Dacryadenitis in hyperthyroidism (with lantern slides), A. B. Reese; 4. Myopia (with lantern slides), Daniel M. Rolett (by invitation).

SECTION OF MEDICINE

The Section held no meeting on the regular date, December 18, as a joint meeting was held with the Section of Surgery on December 7.

SECTION OF OBSTETRICS AND GYNECOLOGY—December 18

I. READING OF THE MINUTES.

- II. PAPERS OF THE EVENING—a. The surgical treatment of ovarian dysfunction, Meyer R. Robinson, Discussion opened by Howard C. Taylor, Jr.; b. Light therapy; fundamentals and methods of application, Frank H. Krusen, Associate Dean, Temple University School of Medicine, Philadelphia (by invitation), Discussion opened by Richard Kovacs; c. 1. Diathermy in pelvic pathology, 2. Cinema-diathermy treatment of gonorrhea, Norman E. Titus, Discussion opened by Madge C. L. McGuinness.

SECTION OF GENITO-URINARY SURGERY—December 19

I. READING OF THE MINUTES.

- II. PAPERS OF THE EVENING—a. Vesical outlet obstruction in infants and children—a Study of 208 cases, Meredith F. Campbell; b. Mechanical factors in renal infections with special reference to their incipiency in childhood, David W. MacKenzie, Montreal (by invitation), Discussion opened by: Henry G. Bugbee, Paul M. Butterfield, Abraham Hyman, John H. Morrissey, Joseph F. McCarthy.

SECTION OF OTOLARYNGOLOGY—December 19

I. READING OF THE MINUTES.

- II. SPECIAL DEMONSTRATION in patients' room at 8:00 o'clock—Demonstration of anatomical specimens illustrating the relations between the nasal sinuses and the optic nerve, Mr. Edgar B. Burchell (by invitation).

- III. PAPERS OF THE EVENING—a. A safe and humane method of anesthesia for tonsil and adenoid operations in young children, James T. Gwathmey; b. The etiology of retrobulbar neuritis, John H. Dunnington, Discussion opened by Thomas H. Johnson; c. The present status of the submucous and turbinate operation, Westley M. Hunt; d. The present status of the simple mastoid operation, Wesley C. Bowers, Discussion opened by Truman L. Saunders.

SECTION OF ORTHOPEDIC SURGERY—December 21

- I. PAPERS OF THE EVENING—Subject: Treatment of fracture of the neck of the femur; a. The Leadbetter method, Guy W. Leadbetter, Washington (by invitation); b. The Telson-Ransohoff subcutaneous fixation by Kirschner wires, David Telson (by invitation); c. The Smith-Petersen nail fixation, M. N. Smith-Petersen, Boston (by invitation).

- II. GENERAL DISCUSSION opened by Clay R. Murray.

AFFILIATED SOCIETIES

NEW YORK ROENTGEN SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*—

December 17

- I. PRESENTATION OF INTERESTING CASES.

- II. PAPER OF THE EVENING—Causes of faulty interpretation of sinus films, F. M. Law.

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE
UNDER THE AUSPICES OF THE NEW YORK ACADEMY OF MEDICINE—December 19

- I. Experimental poliomyelitis in a monkey without demonstrable lesions in the central nervous system, M. Brodie.
- II. Directed roentgenography of the thorax, I. S. Hirsch, M. Schwarzchild (Introduced by H. D. Senior).
- III. Effect of x-ray in experimental encephalitis in mice inoculated with the St. Louis strain, S. A. Goldberg, M. Brodie, P. Stanley.
- IV. A rapid method for the diagnosis and isolation of the diphtheria bacillus, M. B. Brahdy, H. Brody, C. A. Gaffney, M. Lenarsky, L. W. Smith.

- V. Absence of dietary anti-anemia substance in diet causative of canine black tongue, D. K. Miller, C. P. Rhoads.
- VI. Extraction of an emulsion-stabilizing substance from nitella with distilled water, S. E. Hill (Introduced by W. J. V. Osterhout).
- VII. Observations on ulcerations adjacent to experimental gastric pouches in dogs, A. Winkelstein (Introduced by G. Baehr)
- VIII. Lead IV of the electrocardiogram in rheumatic fever, R. L. Levy, H. G. Bruenn.
- IX. Clinical identification and measurement of urinary sugars, W. G. Exton, A. R. Rose, E. J. Roehl.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with* THE NEW YORK ACADEMY OF MEDICINE—December 27

- I. PRESENTATION OF CASE REPORTS—a. Congenital aplasia of islands of Langerhans with diabetes mellitus, P. A. H. Midelfart (by invitation), Robert A. Moore; b. An osteoplastic tumor of obscure origin and relationship, Sheldon A. Jacobson.
 - II. PAPERS OF THE EVENING—a. Metastasizing pineal body tumor, Alfred Plaut; b. The influence of dinitrophenol on carbohydrate metabolism, Max Mishnofsky (by invitation); c. Meningo-encephalitis caused by the Cysticercus, Vera B. Dolgopol.
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DEATHS OF FELLOWS OF THE ACADEMY

BAINTON, JOSEPH HECTOR, M.D., 140 East 54 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1901; elected a Fellow of the Academy January 4, 1918; died January 7, 1935. Dr. Bainton was a member of the County and State Medical Societies and a Fellow of the American Medical Association. At the time of his death he was physician to Morrisania City Hospital and consulting physician to St. John's Hospital, Long Island City.

BANG, RICHARD THEODORE, B.A., M.A., M.D., 139 West 11 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1879; elected a Fellow of the Academy October 1, 1908; died January 16, 1935. Dr. Bank was a member of the County and State Medical Societies and a Fellow of the American Medical Association and of other medical organizations.

BROUNER, WALTER BROOKS, B.A., M.D., 45 West 9 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1891; elected a Fellow of the Academy December 2, 1897; died, January 1, 1935.

CARLISLE, ROBERT JAMES, M.D., 56 East 78 Street, New York City; graduated in medicine from Bellevue Hospital Medical College in 1884; elected a Fellow of the Academy February 6, 1902; died January 15, 1935. Dr. Carlisle was a Fellow of the American Medical Association and a member of the County and State Medical Societies.

For 48 years Dr. Carlisle was a member of the faculty of the Bellevue Hospital Medical College. In 1887 he joined the staff of the medical college as an assistant to the chair of *materia medica* and *therapeutics*, and five years later was made assistant to the chair of *principles and practice of medicine*.

After Bellevue Hospital Medical College became part of New York University, Dr. Carlisle continued to serve on the faculty of the college, and in 1898 became clinical lecturer on medicine. In 1907 he was appointed lecturer on medicine, and in 1924 succeeded the late Dr. Hermann Biggs as Professor of Medicine, serving as such until his death.

Dr. Carlisle was a founder and a former president of the Bellevue Hospital Alumni Association and held the office of historian continuously. When the Alumni Association of the New York University and Bellevue Hospital Medical College was formed in 1899 he was elected its president.

At the time of his death Dr. Carlisle was Consulting Physician to Bellevue Hospital and St. Joseph's Hospital, Far Rockaway.

CONNORS, JOHN FRANCIS, B.A., M.A., M.D., 59 East 54th Street; graduated in medicine from New York University Medical College in 1895; elected a Fellow of the Academy December 7, 1905; died January 5, 1935. Dr. Connors was a member of the County and State Medical Societies, the American Surgical Association, the New York Surgical Society and a Fellow of the American Medical Association and the American College of Surgeons. He was surgical director at Harlem Hospital since 1925 and consulting surgeon to St. Mary's, Waterbury and Stamford Hospitals.

FISKE, EDWIN RODNEY, M.D., 604 Fifth Avenue, New York City; graduated in medicine from the New York Homeopathic Medical College in 1895; elected a Fellow of the Academy November 6, 1924; died December 19, 1934. Dr. Fiske was a Fellow of the American College of Physicians. At one time he was Professor of Medicine in the New York Homeopathic Medical College and was physician to Flower and Peck Memorial Hospitals and consulting physician to Yonkers General, Brooklyn, and Nurse and Infirmary Hospitals.

HUBER, FRANCIS, B.S., M.D., 209 East 17 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1877; elected a Fellow of the Academy December 3, 1885; died December 26, 1934. Dr. Huber was a member of the County and State Medical Societies, the American Pediatric Association, the National Tuberculosis Association and a Fellow of the American Medical Association. At one time he was chief of the pediatric clinic of the Vanderbilt Clinic and consulting physician to Gouverneur Hospital.

LEACH, PHILIP, M.D., Medical Director, Captain, U. S. Navy, Retired, New York; graduated in medicine from Rush Medical College, Chicago, in 1881; elected a Fellow of the Academy November 5, 1896; died October 19, 1934. Dr. Leach was a Fellow of the American Medical Association and the American College of Surgeons: He entered the Navy in 1891 and retired in 1919 on attaining the age of 64.

PHILLIPS, WENDELL CHRISTOPHER, M.D., 133 East 58 Street, New York; graduated in medicine from New York University in 1882; elected a Fellow of the Academy October 7, 1886; died November 16, 1934. Dr. Phillips was

born in Hammond, St. Lawrence County, New York, June 9, 1857. His early education was obtained at the Potsdam Normal School. He devoted himself to the diseases of the ear, nose and throat and was Professor of Otology at the New York Post-Graduate Medical School and Hospital for twenty years, as well as aural surgeon and director of the Manhattan Eye, Ear and Throat Hospital. He took an active and conspicuous part in organized medicine and was President of the Medical Society of the County of New York in 1909 and the Medical Society of the State of New York in 1912 and is responsible for the establishment of the Sections at present an important feature of the Annual meetings. He was for many years closely associated in the work of the American Medical Association serving in the House of Delegates for six years from 1912 and as a member of the Board of Trustees from 1917 until he became President in 1926. Dr. Phillips' chief monument to fame will be his contribution to the cause of the Hard of Hearing first through his connection with the League for the Hard of Hearing and later as the founder of the American Federation of Organizations for the Hard of Hearing, of which he was its first President and to which he gave unsparingly of his time and strength. He was a staunch advocate of public health measures and the annual health examination; he was instrumental in the initiation of Hygeia, the popular health magazine published by the American Medical Association. He was the author of a textbook, "Diseases of the Ear, Nose and Throat," besides many papers and articles on subjects connected with his specialty.

He was a fellow of the American College of Surgeons, of the American Otological and New York Otological Societies and of the American Laryngological, Rhinological and Otological Society, of which he was a President in 1907.

WEINSTEIN, HARRIS, M.D., 222 West 77 Street, New York City; graduated in medicine from New York University Medical College in 1891; elected a Fellow of the Academy February 1, 1912; died January 8, 1935. Dr. Weinstein was a member of the County and State Medical Societies and a Fellow of the American Medical Association and of other medical organizations. He was at one time an instructor in the New York Post-Graduate Medical School and attending physician at Jewish Memorial Hospital.



BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

VOL. 11

FEBRUARY, 1935

No. 2

*Anniversary Discourse**

THE MEDICAL PROFESSION IN THE NEW AGE

HONORABLE FIORELLO H. LAGUARDIA
Mayor of the City of New York

I am sure that you will recognize by this time that the only one not in cap and gown and not in evening attire on the platform is the Mayor of the City of New York.

Some one wrote a book about "Fifty Million Guinea Pigs." I wish the author were here tonight to write about one guinea pig who is up before you for dissection. You know, I ought to have come here tonight well prepared. As Dr. Sachs stated, he did invite me about two months ago, and he was very careful to leave with me a large assortment of pamphlets and reports which he advised me to read. And then along came Dr. George Baehr who looks after me from time to time (so if my complexion is sallow that is his fault), and he said, "Never mind those. Read these pamphlets!"

Then Dr. Goldwater said, "I understand you are going to speak at the Academy of Medicine." I said yes. He said, "You had better go well prepared because they are very critical. I have prepared a memorandum for you. You read this."

* Delivered before The New York Academy of Medicine, December 6, 1934.

Only a few days ago Dr. Rice, the Health Commissioner said, "Ignore all of that stuff and read this."

And this afternoon John Kingsbury came along and said, "This is the speech you ought to deliver."

To tell you the truth, I haven't read any of them. So anything which I may say you cannot hold any of these gentlemen responsible for.

In looking over the archives of City Hall, I found a very carefully indexed file. If I have to make a speech at a reception for a channel swimmer I can pull a folder out under that name, or six day bicycle riders, I can pull that out. But I couldn't find anything on "medicine" or "academy."

Of course, every one is interested, I suppose, in this new age which we are approaching. It is rather difficult to come to a gathering such as this and talk on a subject with which you are so intimately connected and know so much more about than I do. But it might be useful perhaps in gleaning how little the laymen know about your troubles.

We have a great problem confronting us as a city government in the matter of public health; and I know that I incurred the displeasure of a great many of your profession when I went outside of the City of New York to select a Health Commissioner. I did that, and I would do it again if I had the same problem confronting me, after spending an entire afternoon in this very building where you were good enough to permit me to meet the representatives of the five county medical associations, the representatives of this institution of learning.

I could not agree with the popular belief that because a man happened to be a good doctor or a good surgeon he would be a good public health officer in a city of seven million population. Neither could I agree that if a doctor happened to be a close personal and intimate friend of mine, he would necessarily be a good public health officer. In that meeting which we had in this building there is one thing that was certain, that the five county medical associations

could not agree on any one man, and it was also very clear that each believed the proponent of the other to be either unfit or unqualified or inexperienced for the great office of Public Health Commissioner of the City of New York.

So I did the next best thing, and that was to take a survey of the entire country and to find the man who had established an actual record of accomplishment in public health work. I did that, and I have no apologies to offer.

The next important place in which the medical profession naturally would be concerned was that of the Commissioner of Hospitals. On that I found a unanimity of opinion, that the best available man in the country was Dr. S. S. Goldwater, and I appointed him.

Now gentlemen, I know you want me to talk frankly, and even if you don't, I do not know any other manner of talking. I want to say this, that both of these Commissioners, Public Health and Hospitals, have a most difficult problem and a most difficult task confronting them, and they need not only the cooperation and the moral support of the people of this city, but they are surely entitled to the cooperation of their own profession. I hope you will give it to them. If you don't, we will carry on anyway.

I found this, that there is such a thing as medical politics—if you get what I mean. I found that under the Department of Hospitals where we have 26 different institutions, we had 26 different groups, cliques, to contend with. Dr. Goldwater is trying to break that down, and I think he will be able to do it. I found in the Department of Health a large staff of employees indexing every microbe and germ that some one said they could find. We disposed of something like 400 employees in order to increase the efficiency of that department; and they will never be missed. We sought to replace the 400 by some nine or ten professionally trained and experienced specialists, but in that I learned the other day that I was thwarted by the veto of the Board of Aldermen. But that fight isn't over yet.

Now, there is a strange thing about all of this, and that is, if the City of New York or any other large city, that

under the conditions in which we are living public health is one of the most important functions of municipal government. That department should be entirely divorced of politics and should be entrusted to men who understand the problem of public health. When I took office on January 1st, I stated to the people of this city that we would endeavor to find men who were fit, trained and specializing in the field of the respective departments of the city to head those departments. Now, this is rather new to New York and most unorthodox in politics. We are still in the experimental stage. That is why I welcome this opportunity to meet members of the Academy to ask them for their cooperation in carrying on the work which we have planned.

I found this. I started out with all the enthusiasm of a novice, and of course, as you all know I am new to this game—this is only my thirtieth year of public office—and I believed that I would meet with immediate response and approval from the medical profession with a well thought out, comprehensive program of public health. We planned clinics, and health centers, and surveys, full time instead of part time, and we sought to obtain and to profit by the experience of other cities in establishing a real health service in this city.

But lo and behold, instead of finding the enthusiastic support I really believed we would get from the medical profession, we found a great deal of opposition from the neighborhood doctors who were opposed to a system of public health centers and to the extension of the clinics in the city service. It was rather surprising to me. Yet, on reflection and after talking to a great many of them, I can at least understand their viewpoint.

What we must decide, and what will have to be decided in this country, not within the next few years but perhaps within the next few months, is that very question, whether public health and medical service and the individual health of the citizens must be subordinated to the private practice of the neighborhood doctor or not. Gentlemen, you cannot escape it.

There are two professions that have been the hardest hit in this depression, and they are the medical and the legal. Some one might say, "How about the engineers and the architects?" They, too, have been hit, but the future will take care of them. There is no question about that. The legal profession as such as I see it, has not a very bright outlook in the offing. With education, law, the rights under the law, are no longer such a mystery. True, the lawyer was a big man at the time when education was limited. But now business men and individuals have learned that there isn't much profit in litigation, that there is nothing mysterious or difficult about understanding the meaning of the law, and as we progress we will find that the legal profession becomes less important in our national, social, or economic life.

That is not true of the medical profession. That is important, and so important as to become a matter of public and national concern. No science has progressed any more rapidly or successfully than that of medicine and surgery. The question now presents itself if the benefit of that progress is to be limited to a certain few who can afford to avail themselves of it, or is it a matter in which the public and the government and the state has a direct interest.

Are we to accept a condition where surgery and medicine, skill, accuracy can be so certain and yet be a matter of luxury? That is all it comes to, gentlemen. Or is the state to avail itself of all the progress made in medicine and surgery for the benefit of the state and the community. We could dispense tomorrow with every lawyer in this city, and I will guarantee to you that I can run the City of New York. But we could not dispense with the medical men for one day.

And yet, what is the situation today? It has become so in this period of economic stress where proper medical treatment is almost a luxury. And the medical profession has a hard time of it, a very hard time of it. It is pretty hard for a doctor to sit in his office, to wait for his patients, and the only caller he has is his landlord demanding his

rent, and then go to a clinic and work hard for four hours. We understand that. We understand that perfectly. But seeking to maintain the status quo will not solve either the problem of the community or the problem of the doctor.

We find this—and unfortunately, I took office as the head of this city at the very peak of the depression—that the load on our public hospitals, city hospitals, is constantly increasing, while the private hospitals are hardly able to support themselves. We had to meet a deficiency of nearly a million dollars to care for the cases taken over by private hospitals for which the city was responsible. In other words, the support of the private hospitals decreases in periods of depression almost in inverse ratio that the load on these hospitals increases. Let's be practical about it.

A friend of mine who has a job and earns a fair salary (his salary was reduced of course), has a little daughter who went to a private hospital for a simple tonsil operation. I need not tell you that the child was there two days and a half, and the hospital charge, including the nurse, the room, the operating room service, and other incidental charges, was \$108.00. But I submit, suppose that family had to meet a serious major operation. They just could not afford to send her to a private hospital.

What are we going to do? Is a stubborn resistance to existing conditions the answer? I find this confusing reaction, that the neighborhood doctor who is hardest hit by the present economic conditions, rebels most bitterly against any change in our medical service.

As I see it, it is the duty of the state to protect the citizen not only against aggression from a foreign enemy, and to protect him in his individual rights and his property, but also his well being and his health. If medical treatment were to stop we would in a short time have an epidemic or a situation—in which the state must step in. As I see it, gentlemen, the time is not distant when the city or the state will have to take over almost all of the hospitals in a city. Now, I am not talking about New York City alone. I am talking about all cities. Conditions in New York are

no different from those of other large cities. We find daily, the constant appeal for greater aid from the city or state.

Then we come to the question of direct individual medical care before the patient arrives at the hospital stage. Our experience has been that we are called upon to furnish as much medical aid as our relief funds will permit. We are criticized for that from many quarters. Now I ask, what is the answer? Are we to cut that off entirely? Are we to cause an investigation of every case that applies for hospital treatment before he is admitted? That is our responsibility. I cannot agree that we should not use relief funds for medical care or nursing care. Nor can I agree at this time that before a hospital case is admitted we should have a thorough investigation of the ability of that patient to pay. Yet, we cannot continue very much longer under the present conditions.

I repeat, there is a great deal of justification for the protest of a large number of the medical profession against existing conditions. There can be no question as to the facts of the existing conditions. Yet, the minute we approach the mere remote suggestion of any system whereby public health and medical treatment would become a matter for the state, we meet with the most stubborn opposition. One of the two things will eventually have to be decided, and I believe that no one can decide it better than the medical profession itself.

All sorts of arguments are presented. And that is true of any innovation or any change of conditions which have existed for any length of time. I am sure many of you will remember twenty years ago when the discussions were rather heated on the subject of workmen's compensation. It was then said, "Why, that is absurd. Anything like guaranteeing compensation to an injured workman would encourage negligence. Why, workmen would injure themselves in order to get compensation," and old cases three and four hundred years old were cited by learned judges who talked about the fellow servant rule and contributory negligence and the assumption of risk, and all sorts of mouth filling phrases.

It was a hard fight to establish in this country the first employers' liability or workmen's compensation law. The first laws were rather unsatisfactory and defective. Yet, I don't believe that any one today would suggest repealing employers' liability or workmen's compensation laws in any of the states of the Union. That is true of any change which was brought about in this country—always late, always almost a generation, or at least a decade late in coming.

Now we are confronted with the question which is so vital, of such great concern to your profession: first, adequate treatment, surgical and medical, in hospitals in the cities and in the rural districts; secondly, the question of sick insurance.

I attended a conference in Washington a few weeks ago and sat next to a very learned physician—I think he came from the State of Connecticut—and his argument against sick insurance was this. He said, "Theoretically it might be a good thing, but actually it would be very dangerous. Why, if the doctors were selected they would be political selections, and if they were political selections they would be bad." Of course, I had to agree to that. There is no question about that. It wouldn't be how much medicine you know, but what politicians you know. No question about that.

Then he said, "If you leave it open the poor doctors would get all of the practice."

I said, "Why?"

He said, "Well, a conscientious doctor would look at his patient and tell him he is not sick, all he needs is a laxative and tell him to go back to work. That doctor would not be popular. But the poor doctor would say, 'Yes, you are a very sick man. I will give you a certificate so you can go on sick insurance.' He would become very popular."

Now, I don't believe that, don't believe it at all. He asked me why. I didn't know why exactly, but I just had more confidence in his profession than he had. I want to say this,

and this may sound extreme and perhaps unrelated and unconnected, but all during the eleven years of prohibition the percentage of the medical profession who transgressed or violated their ethics was so small that it required a fraction to figure it out. It is unrelated perhaps and unconnected, but it serves in a measure as an illustration of what might be expected of the profession when this country accepts or goes into a nation-wide sick insurance system.

I am rather certain that something of that sort will come about in the near future, because as I have said before, health is a matter of prime importance to the state and to the individual. What the program will be it is rather difficult at this time to state. I don't believe that Washington at this moment has a definite, complete program on the social insurance suggested in the message of the President to Congress, but that the government is giving very serious consideration, thought, and study to these questions I am sure you all know.

There is a school of thought in this country that believes all we have to do is to leave things alone and wait for prosperity to return. The American people, a great many of them, have stiff necks now looking around the corner awaiting it. What we must do is to adjust ourselves to a new normal. It is simply impossible to expect any condition to return with our improved methods of production that would employ all of the present available labor in this country. It just can't be done.

We can produce in four or five months all that the people of this country can consume in one year. So that even if the people had the purchasing power to acquire all that they need, it is necessary to create a spread to give employment to the willing workers that are available in this country.

We are undergoing at this time a complete economic readjustment. And that, of course, will affect the medical profession as it will every other profession, trade, or vocation in the country. I am sure that those in charge or who have the responsibility of solving these problems want the aid, the advice, and the counsel of your profession in the

matter concerning the public health and the care of the sick. But surely we cannot get much help in any doctrine which says, "Close your clinics, close your health centers, no relief for the sick; let them come to their own doctor." That just can't be done.

I tell you, it would be much easier to come here and say that everything is wrong and that people should not be catered to, and that every one should be made to go to his own doctor and carry on. That would be the popular thing to do, and I suppose it would be said that the Mayor knows what he is talking about. But that won't solve any of our problems. We are not going to close any of the clinics. We are going to extend the health centers throughout the city.

The private hospitals call upon us to increase the city hospital facilities. We will open three hospitals now in the course of completion in 1935. And that work must continue.

I hope the Legislature of the State of New York which convenes in January will give a great deal of consideration and thought to this most vital question. And I again urge you as a profession to formulate a plan and to present it to the State Legislature.

Perhaps the time is not distant when some system might be found for adequate compensation to all doctors who render public service. In fact, that will have to be done before very long.

As I said, I do not know how far the national government is going into this particular question. I do know that the President has referred to it in his message to Congress, and I do know that many of his advisors are giving the question a great deal of thought and study.

There is a great deal of criticism, gentlemen, on the part of some as to what the Federal Government is doing in this matter of relief. I am very much amused to hear people talking about state rights and individual freedom and Constitutional limitations, and arguing that the Federal Government should just stay out and give business a chance. As a member of Congress, I lived through that

period when we appealed to our own government to send relief to the State of Arkansas when they were unable to relieve their own citizens who were starving as a result of the drought. They were told, "But that would be unconstitutional, beyond the function of the Federal Government, a matter of local responsibility." Now you know, gentlemen, that either a legal formula or a beautiful phrase never fed any hungry children any time anywhere.

I could tell you from my own experience as a national legislator and as a city official, that I do not know what would have happened in this country if we didn't have Federal aid in our relief problem. Stop to consider, gentlemen. The City of New York has about 400,000 families whose very existence depends upon the relief which they receive. We have spent in the month of October \$18,750,000 for relief in this city. We couldn't carry it on alone. The Federal Government contributed 50 per cent of that. In the month of December we are spending \$19,325,000 for relief.

Oh, some will say that there are families on the rolls that are not entitled to it. Of course there are. Out of 400,000 families do you suppose that we are one hundred per cent perfect in the administration of that? Why, not even one of your surgeons can be one hundred per cent perfect. Of course, the operation may be successful, but you know what very often happens. So it is with the administration of a relief fund caring for 400,000 families. Suppose we are only 5 per cent off, that would give us a high rating of efficiency. That would still be several thousand families. We are doing the best that is humanly possible.

But suppose that relief were to stop. Then what would happen? And yet, we hear all this talk about the Federal Government going beyond its constitutional powers in this matter of relief.

Now, we have a budget for December. We are trying to raise the money to meet that. I have been criticized for going out and trying to find that money. Well, I will tell you right now that as long as I am Mayor of the City of

New York, I am going to find the money to feed these people who are unemployed through no fault of their own.

I want to express appreciation of the cooperation that the Federal Government has given to New York City and to all the other cities of this country.

Now, gentlemen, of course, it is difficult to come here and paint such a gloomy picture. But we might as well face the facts, and the facts are that the young man who enters medical school today enters it with the knowledge that he is going to devote his life to the public service. If he enters it with any hope of making a fortune out of it, he might as well wait and marry some one and get a father-in-law who can buy him a seat on the Stock Exchange—and his chances are just about the same.

Public health will be protected. The medical profession that has contributed so much to progress, to civilization, to humanity, I am sure will live up to the tradition of their profession and meet these new conditions as they come along.

EXHIBITION IN THE LIBRARY

THE DEVELOPMENT OF THE STETHOSCOPE

An exhibition has been arranged by Dr. Paul B. Sheldon, with assistance from the Library Staff, illustrating the history of the stethoscope from its invention by Laennec down to modern times. Stethoscopes from the Academy's Historical Museum are shown, together with others kindly loaned for the occasion. The exhibition will be continued from February 13 to March 16.

THE DOCTOR AND THE STATE *

(Unsigned Communication)

A discussion of the relationship of the doctor to society necessarily implies that the medical profession has some peculiar relation to the state, other than that which is applicable to those in other callings.

A critical search for the reasons for such a relation does not show that it arises from any especial privilege which society claims over physicians. The peculiar responsibility rests solely upon tradition—it is the outgrowth of the profession's willingness to accept it as its contribution to the state. It is a tradition which has grown with the ages, has been approved by the doctors and by their fellow citizens. It is a potent factor in our lives and should be so, for if the human race has shown wisdom in its development, the lessons to be learned from the past should be preserved to the present. Otherwise, we shall lose what is of inestimable value.

Thus the subject must be approached from a viewpoint which differs from and is held to be more worth while than the purely materialistic.

There are many reasons in support of the view that the difficulties in which the world finds itself at the present time result largely because of a departure from spiritual values. Self-interest, selfishness, lack of consideration for others and too crass practicality are all elements in the events of life which have brought us to the edge of a somewhat terrifying precipice.

We, as doctors, are no less endangered by these factors than are others, but we, as doctors, have a peculiar duty in resisting these tendencies if we are to live in accordance with the safeguards which have gathered around the medical profession throughout the ages.

* This article appears also in the February Number of The East New York Medical Bulletin.

The discussion may well begin by quoting from, "The Principles of Medical Ethics of The American Medical Association" as adopted in June 1912.

"A profession has for its prime object the service it can render to humanity; reward or financial gain should be a subordinate consideration. The practice of medicine is a profession. In choosing this profession an individual assumes an obligation to conduct himself in accord with its ideals."

After formulating precepts of conduct, the Principles conclude with the following:

"While the foregoing statements express in a general way the duty of the physician to his patients, to other members of the profession and to the profession at large, as well as of the profession to the public, it is not to be supposed that they cover the whole field of medical ethics, or that the physician is not under many duties and obligations besides those herein set forth. In a word, it is incumbent on the physician that under all conditions, his bearing toward patients, the public, and fellow practitioner should be characterized by a gentlemanly deportment and that he constantly should behave toward others as he desires them to deal with him. Finally, these principles are primarily for the good of the public, and their enforcement should be conducted in such a manner as shall deserve and receive the endorsement of the community."

These principles embody the essentials of all similar codes previously put forward from the first days of organized medical practice. They have gained the force of law. In a decision made by the United States Supreme Court, Mr. Justice Brewer states,

"The physician is one whose relations to life and health are of the most intimate character. It is fitting not merely that he should possess a knowledge of diseases and their remedies, but also that he should be one who may safely be trusted to apply those remedies. Character is as important a qualification as knowledge, . . . These propositions have been often affirmed."

Fite in "The Study of Ethics" raises an issue not to be disregarded:

"In all the professions there is a certain felt divergence between the demands of professional honour, and intellectual integrity and the conditions of professional work, and a man who should give unyielding and absolute devotion to honour would not be able to maintain his position . . . For the physician the strictly scientific practice of medicine leads often in one direction, the condition of remuneration in another."

And that cynical philosopher, George Bernard Shaw in his preface to *The Doctor's Dilemma* states,

"As to the honor and conscience of doctors, they have as much as any other class of men, no more and no less."

If this statement be true, the medical profession does not stand in a peculiar relation of responsibility to the state. Those who have read *The Doctor's Dilemma* and particularly the Preface thereto cannot have escaped a feeling of resentment at the cold-blooded way in which Bernard Shaw analyzes the weaknesses of the doctor who is called upon to meet an emergency of illness and at the same time recognizes that he must be remunerated for this service.

If one go back in our study to the earliest history of medicine he finds that the Babylonians about twenty-two hundred years before Christ laid down rules for the control of the practice of medicine in the laws as compiled by Hammurabi. Even at that early date, the fees that a physician should receive and the punishments that were to be meted out to him in case his treatment resulted in injury or death are laid down. The scale of fees was a sliding one depending upon the ability of the patient to pay which was very similar to that which is in operation at the present time.

During the subsequent centuries, these regulations fell into disuse and among the Greeks and even the early Romans, there was little effort made to regulate the practice of medicine.

Gradually, however, the situation changed and efforts were made to protect the public against the great amount of quackery, chicanery, cult healing, mysticism, etc., that characterized that period of civilization.

In the 16th Century, the Royal College of Physicians of England adopted the *Statuta Moralia* for the conduct of medical practice.

It was about 1790 that Sir Thomas Percival, who died in 1804 at the age of 64, formulated a Code of Medical Ethics

which has become the generally accepted standard of ethics governing the relation between doctors themselves and their patients and society.

It is interesting to note that there is recognized at all times the line which divides the interests of the doctor from that of the patient in the question of the care of the latter and the remuneration to be received by the former. This is summed up as follows by Leake in the 1927 edition of Percival's "Medical Ethics,"

"The fundamental ethical question of the medical profession thus arises: if physicians have a pecuniary interest in treating the ills of humanity, can they in honesty really desire to see mankind in perfect health? Ideally, the answer is 'yes'; hedonistically, it is 'no'; and actually society has found it necessary to interfere by law to safeguard the interests of both. This has usually been done by enacting fee codes and by requiring a certain standard of training and skill before granting permission to practice medicine. That the public required protection from the primitive physician is shown by the fact that all of the early fee codes attempted to apply the principle of *lex talionis* in case the physician harmed the patient."

Thus it is recognized that ethically and hedonistically there is a constant warfare within the doctor's orbit. Tradition teaches that ethics shall prevail. Today we are faced with the problem of abiding by tradition or descending into the market place. If we choose the latter, we must be of the market. If we choose the former, we must remain under the protection of professional ideals.

The earliest record that is found cited in Garrison's "History of Medicine" of an actual license to practice medicine occurred in the Emperor Frederick II's edict in 1224. This followed the establishment at Salerno of a school of medicine, the earliest of its kind, and a candidate for license was examined in public by the masters at that school. The candidate must have studied logic for three years, medicine and surgery for five years, and have practiced for one year under some experienced physician. The candidate in surgery had to give evidence that he had studied the art for at least a year, in particular anatomy. The physician was required to treat the poor for nothing, to visit his patients twice a day and once a night if neces-

sary, to avoid collusion with apothecaries and inform upon them if they adulterated or substituted drugs.

The medical fee was fixed, amounting to about 35¢ for an office visit or for a house visit within the city, and approximately \$3.00 for out of town visits, but in this case, the physician must pay his own expenses. The sale of poisons, magic potions and aphrodisiac philters was punishable by death if any person lost his life thereby. It is further noted that foods, drugs and apothecaries' mixtures were examined at stated intervals by inspectors and timely regulations were made in municipal hygiene and rural hygiene.

Garrison comments,

"Given the time at which it was issued, it would be hard to improve upon the plain scope and intention of this law, which was followed by similar ordinances for Spain (1283) and Germany (1317), and was again confirmed by Joanna of Naples (1365).

This edict was a strong factor in raising the status of the physician above that of the then numerous quacks and charlatans.

Let us now pass six hundred years to conditions as they are presented today. An address was given by the Honorable Joseph V. McKee on the occasion of the Anniversary Discourse of The New York Academy of Medicine a year ago entitled "Medicine and Modern Sociological Trends." After an unusually able presentation of the development of medical practice through the times, somewhat impressive to a doctor in that it shows the broad knowledge of our profession which is possessed by a layman, Judge McKee closes with this declaration :

"This is the dedication, the consecration of the physician to the ideals of his profession. But more than that is asked of him today. With these great sociological movements under way and even at fruition, it calls on him not merely to complain, not merely to disagree, not merely to debate but to find a fuller and a freer and a greater place for medicine, not only in the curing of human ills but in the great regime to make life better and happier and nobler—to bring to humankind some of the happiness on earth that the elect expect of heaven."

A year later another Anniversary Discourse was delivered at the Academy by Mayor LaGuardia who chose for his topic, "The Medical Profession in the New Age." And, as we know, President Roosevelt, as a part of his social security program has called together a notable group of medical men and others to formulate a procedure whereby our citizens may receive the benefit of the splendid medical attention that the profession is able to give to them. An adjustment apparently is needed that this service may be rendered most efficiently. The profession up to the present time has been somewhat negligent of this responsibility which now government forces are putting squarely in their hands. Men in high government service are giving serious thought to the relations between the medical profession and the state. Let us, as Judge McKee phrases it, "find a fuller and a freer and a greater place for medicine."

Professor Sigerist, the Medical Historian at Johns Hopkins University last year delivered an address on "The Physician's Profession Through the Ages." In a masterly way he followed the duties and the responsibilities of the doctor to the state and showed inferentially at least that they do have a peculiar responsibility. His address closes with the following:

"The history of the medical profession today has reached a crucial point, and it is our duty to save the efficiency of a noble profession, that not only has a great past, but a still greater future. I would like to close by repeating what I have written once before; never before has society presented the physician with so wide a field of activity and with so much influential power. If never before, certainly today the doctor may become a statesman, the Asklepios Politikos visualized by Plato."

It is our concern to determine how this may be done and how we shall discharge the peculiar responsibility imposed by long-established tradition upon our noble profession.

The first obligation which rests upon us is to steep ourselves in this tradition with a determination that the heritage which is ours is in no way sullied, and that we are controlled in our activities by a feeling that life is not worth the living unless by our efforts and in accordance

with each one's endowment some betterment of the enjoyment of life is accomplished. This is not sermonizing if we are ourselves in accord with those who believe that the remedy for the terrifying condition in which the world now finds itself lies in an acceptance of spiritual values rather than material.

If there be within our profession those who are not stimulated by a feeling of obligation to live in accordance with this heritage, it is our bounden duty to see that such are made to conform to the spirit of the Hippocratic oath, which is the origin of the high ideals of medical practice. The spirit of this oath has lost none of the force it possessed when it was promulgated, nearly three thousand years ago.

The first obligation of the doctor to the state requires that he be an example in act and teaching to the fact that he is called upon to render service, thinking first of the value of the service rendered and after that of the remuneration to be received therefor, which is the privilege of being ranked as a member of a learned profession.

That there exists a counter responsibility on the part of society to see that in this attitude the doctor's life blood is not sapped and that a procedure is set up whereby he may enjoy a life commensurate with the effort and strength, the sincerity and devotion that he expends for the benefit of society cannot be gainsaid. If my reading of the times is correct, in spite of all the carping and criticism that is aimed at the medical profession, society does recognize this obligation and if we rise to our opportunities, we may do so with a faith that our existence will not be jeopardized.

If, however, we adopt a course of stiff necked blindness to the needs of the world and a willingness to consider that our own interests are paramount to those of others, we will find forced upon us conditions that will neither be to our advantage nor to that of society.

That tragedy is imminent is shown by a letter which appeared in a medical publication recently. There, one who had accepted the spirit of the tradition we have discussed

as the cornerstone of his responsibility, fought valiantly to uphold it and failed—failed because in it there was not the power to sustain life and dependent ones. He was not afraid at having broken the law but at having “deeply wounded that something—tradition—the ideals and concomitant aims that go with our diplomas.”

And another physician signs his name to a letter saying that the splitting of fees is all but a universal practice in his experience and that it is not uncommon for the doctor and the consultant to decide upon an operative procedure solely so that both may participate in the expected fee.

When such things as these can be, no one can doubt that some remedy must be found and all must bear a share in creating a relationship that will not permit such despair or such practices to drive a doctor to a sacrifice which thus excoriates his soul.

It was less the medical profession itself than outside influences which inaugurated the great improvement in the education offered by our medical colleges two decades ago. It is not to our credit that education thereafter has received so little attention by us during those two decades, and it is our concern to see that the improvement of the medical undergraduate training gains its full fruition by affording means of further education to the doctor after he has received his degree.

We are fully aware that in many instances the internships in our hospitals are of far less educational value than they should be. In fact, it has been said by one of our most eminent undergraduate educators that in many instances the young doctor has lost something of great value at the termination of his internship which had been in his possession at the time of his graduation. He referred to the painstaking care with which the student approached any problem, whether scientific or clinical, which had been inculcated into him in his student days. With the loose, hurried, unconsidered methods employed in some of our hospitals, the intern adopts short cuts and less orderly

thinking than had been his previous habit. And even more disturbing is the testimony of interns that in some instances they were inducted into habits of low ethics and violation of honest behavior.

It is heartening to know that a serious study of this situation is now being made in this city under the able leadership of a group including the medical school deans and others named by the leading hospitals and the Academy of Medicine. It is to be hoped that this particular obligation will be met in such a way that within a reasonable time the interns will receive excellent training in medicine and its ethics comparable to that which they have received in their undergraduate work.

Even when this is accomplished, our needs in this especial phase will not be met until we go a step farther and provide for the continued education of these same young doctors.

There are at our disposal unequalled educational advantages which are largely going to waste while at the same time there is a group of earnest young men and older ones, too, who would only too gladly avail themselves of these advantages were the proper procedure set up.

The enthusiasm with which doctors at the present time grasp opportunities indicates the gross waste which occurs unless all our facilities are fully utilized. Let each bear his share in accomplishing this.

There is another direction in which our obligation to the state is becoming more and more clearly indicated year by year. This has to do with what is ordinarily considered as falling within the domain of public health. At first sight, there is always a clash between the interests of the public as seen in the activities of our health departments and the practicing physician.

It is with a sense of shame that we recall that when Dr. Hermann Biggs wished to make a real advancement of the public health interests, he was opposed by The New

York Academy of Medicine, a sin which insofar as may be, has been expiated by a whole-hearted support of all public health activities by that institution in subsequent years, with, at the same time due consideration to the proper interest of practising physicians.

Reference was earlier made to the medical aspect of the President's social security program and it is within this that the doctors consider themselves especially menaced. At first glance, any organized effort on the part of society to set up a method whereby sick individuals shall receive medical care, except in the long-established way of seeking it out for themselves and arranging for it by a personal agreement between the patient and a member of the medical profession, appears to many to seriously threaten the very foundation of professional life.

Upon careful study and thoughtful consideration this threat does not seem to be serious provided we as a profession will recognize the necessities of the case and meet them squarely. We cannot escape from the general proposition that it is our desire to see that every ill person receives the best available medical care. Again, we are inevitably faced with that clash between the ideal and the practical to which reference has been made as having been recognized from the earliest days of medical practice. We gladly face our obligation to society because it is founded upon the tradition which we revere. In facing this responsibility, we are met with the requirements of our own needs and the solution whereby these two may be reconciled is no easier today than it has been in the past. Possibly modern conditions make it even more difficult.

The thought which should be uppermost is that the medical profession is amply equipped to face this problem and find its proper solution if it will but recognize the necessity of so doing. The profession has not given the requisite thought to the changing trends of which Judge McKee spoke, nor has it fully awakened to the significance of these trends with the determination to recognize that "The medical profession today has reached a crucial point and it is

our duty to save the efficiency of a noble profession that not only has a great past but a still greater future," as expressed by Dr. Sigerist, and to paraphrase him, certainly today the doctor may become a statesman in a wide field of activity and great influential power.

An effort has been made to present the basis for a belief that the doctor does stand in a peculiar relation to the state and that this relation places upon him an especial obligation. Only brief mention of the various directions in which this responsibility may be discharged has been made. Much could be said of any one of the subjects—the ethical standards of the doctor, his education, his relation to public health activities or the part that he must play in setting up efficient methods of medical practice. It has seemed more important to emphasize the traditional spiritual values which must guide us than to go into further practical detail.

This endeavor has found inspiration from three books and those who are not already familiar with them should become so with the assurance that the reading of them will be not only stimulating but delightful:

Sir Thomas Browne . . .	Religio Medici
Stephen Paget . . .	Confessio Medici
Harvey Cushing . . .	Consecratio Medici

These, with Percival's Medical Ethics as edited by Leake, will tend to acquaint one with the traditions of our profession and also furnish him with an outlook upon its practice which will be found most helpful in meeting with good spirit the problems of everyday life.



AN EXHIBITION OF BOOKS
SHOWN AT THE GRADUATE FORTNIGHT
ILLUSTRATING
THE PROGRESS OF GASTROENTEROLOGY

October 22—November 2, 1934

Arranged by
BURRILL B. CROHN and B. D. ROSENKR

Physical limitations of space necessitate the omission of many valuable and essential links in the history of the development of this subject. The purpose of this exhibit was to demonstrate the outstanding publications rather than to give an exhaustive display of all works. We wish to thank the Library Staff for their kind assistance in preparing the exhibition.

Hygiene and Medicine in Antiquity

1. BIBLE.

The Holy Bible, Conteyning the Old Testament and the New . . .
London, by Rob. Barker, 1611.

First issue of the first edition of the authorized version.

Opened at Chapter XI of Leviticus, to show dietary laws and sanitary regulations.

Kindly lent by the Union Theological Seminary.

2. JASTROW, MORRIS (1861-1921).

The Liver in Antiquity and the Beginnings of Anatomy.

In: Tr. Coll. Physicians of Phila. 3. ser. 29:117-138, 1907.

Anatomy began in Antiquity with the study of this organ, regarded at that time as the seat of the soul and of life. It was the organ most carefully scrutinized as a means of divining the future, of exorcizing evil, and of forestalling misfortune.

Opened at p. 126. Excellent clay models of the liver exist dating back as far as 2000 B.C. (Babylonian period of Hammurabi). The lobes of the liver were studied and the position of the fissures and of the gall bladder noted.

3. HIPPOCRATES (*b. ca. 460 B. C.*).

Cinquième livre des épidémies. In his: Oeuvres complètes . . . Traduction nouvelle . . . par E. Littré.

Paris, Baillière, 1839-1861, vol. 5, pp. 198-259.

Opened at pp. 206-207. Case 6 is probably a clinical description of a gastric or duodenal ulcer with a spontaneous remission or healing. This short clinical note is a characteristic example of the ability of the first great physician to observe, to correlate and succinctly to describe.

Hippocrates does not attempt an exact diagnosis; he is, however, interested in prognosis and is certain to tell of the outcome of his clinical cases.

4. GALEN (ca. 129-200).

De Naturalibus Facultatibus . . . In his: Opera ex Nona Juntarum Editione . . .

Venetiis, apud Juntas, 1625, vol. 1, ff. 289/90-308.

- 5.** Galen is the outstanding representative of Roman medicine or rather of Greek medicine in Rome. He was an ardent admirer of Hippocrates, but scoffed at the Alexandrians and subsequent schools. His was the dominant influence throughout mediaeval and monastic medicine. Book III, p. 303 is an excellent example of Galen's knowledge of a gastro-intestinal subject. He is lacking in the underlying understanding of anatomy and physiology, yet he is practical, logical and reasonable in his handling of the subject.

5. _____.

On the Natural Faculties, with an English Translation by Arthur John Brock.

London, Heinemann, 1916.

Opened at p. 237: "Thus the two faculties are clearly to be seen in the case of the uterus; in the case of the *stomach* they appear as follows:—Firstly in the condition of *gurgling*, which physicians are persuaded, and with reason, to be a symptom of weakness of the stomach; for sometimes when the very smallest quantity of food has been ingested this does not occur, owing to the fact that the stomach is contracting accurately upon the food and constricting it at every point; sometimes when the stomach is full the gurglings yet make themselves heard as though it were empty. For if it be in a natural condition, employing its contractile faculty in the ordinary way, then, even if its contents be very small, it grasps the whole of them and does not leave any empty space. When it is weak, however, being unable to lay hold of its contents accurately, it produces a certain amount of vacant space, and allows the liquid contents to flow about in different directions in accordance with its changes of shape, and so to produce gurglings."

6. CONSTANTINUS AFRICANUS (ca. 1015-1087).

De Stomachi Naturalibus & non Naturalibus Affectionibus . . . In his: Opera.

Basiliae, apud Henricum Petrum, [1536], pp. 215-274.

Constantine of Carthage, called Africanus, was a much travelled man. Through his linguistic abilities and his contact with the Arabians he was able to decipher and translate the Syriac and Arabian translations of the Greek and Roman classical texts back into the mediaeval Latin. Salerno, the seat of the first Christian university, recognized him as a teacher and scribe. His skill as a clinician is shown in the chapter on "Affections of the Stomach."

Opened at pp. 266-267, at the section in which Constantine carefully describes the act and causes of vomiting.

Early Clinical Medicine and Renaissance Anatomists

7. ARETAEUS (CAPPANOX) (Second to third century, A. D.).

On the Causes and Symptoms of Chronic Diseases. In his: Extant works . . . edited and translated by Francis Adams.

London, Sydenham Society, 1856, Book II, pp. 291-373.

Little is known of the life of Aretaeus. He was a contemporary of Galen, but it is only in more modern times that he has been appreciated as the clinician of his period ranking next to Hippocrates.

Opened at p. 353, at section on dysentery, remarkable in its perfect description of the clinical features and pathological picture of instances of ulcerative colitis or dysentery. It is quite obvious that Aretaeus dissected his post-mortem material.

8. AVICENNA (980-1037).

Canon de Medicina. Lib. I-V. Translated by Gerardus Cremonensis.

Venice, Petrus Maufer et socii, 1486.

The translations which follow are taken from: Gruner, O. C. A Treatise on the Canon of Medicine of Avicenna. London, Luzac, 1930.

"The standard size of the meal depends on usage and vigour. A normally robust person should take as much as will not produce a sense of heaviness, or a sense of tightness of the hypochondria. There should be no subsequent rumbling in the stomach, or splashing of the food on bodily movement. Nausea should not be experienced, nor a canine appetite, nor loss of appetite, nor great disinclination for exertion, nor sleeplessness. The taste of the food should not repeat in the eructations. If the taste of the food lingers in the mouth a very long time after the meal, it shows that the latter was too heavy.

"A person who cannot digest the amount of food appropriate for him should increase the number of articles of diet, but diminish the quantity.

"A person of atrabilious constitution needs a diet which is very humectant but not very heating.

"A person of choleric constitution needs a diet which is humectant and infrigidant.

"A person who generates hot inflammable blood needs feebly nutritious articles of food, which are cold. One who generates phlegmatic blood needs feebly nutritious articles of diet which are hot and attenuant."

9. MUNDINUS (ca. 1275-1350).

Anatomia. Edited by Martinus Pollich de Mellerstat.

[Leipzig, Martin Landsberg, ca. 1493].

Mundinus, the son of an apothecary, was born in Bologna. The mediaeval revival of human dissecting centers around him. This little treatise of systematic anatomy based on the dissection of autopsy material was the most important anatomical work in the medical schools until superseded by Vesalius' *Fabrica*.

Opened at f. Biv to show sections dealing with the anatomy of the duodenum, mesentery and stomach. A translation of this portion follows. "And it is said that the first intestine is called the duodenum because its length generally is twelve fingers. And a certain intestinal duct from the gall bladder joins this, and for that reason be careful when you dissect not to cut this duct: but cut the intestine well below the duodenum and ligate it and then begin as classical authors began. You have six intestines. The first is the duodenum, the second the jejunum, the third the ileum, and these are slender and placed superficially. The fourth is the caecum, the fifth is the colon and the sixth is the rectum. All these intestines you will see to be rolled up and continuous and attached dorsally, just as all viscera are attached by a certain part which is called *enearas* or rather the mesentery from the mesenteric [veins] which are in it, and the Bolognese call it colloquially the *interium* as it holds up the intestines."

10. DA VINCI, LEONARDO (1452-1519).

I Manoscritti . . .

Torino, Roux e Viarengo, 1901. Fogli B, Dell'anatomia.

The greatest artist and scientist of the Italian Renaissance. He made over fifty careful and accurate human dissections, years before Vesalius, and drew the muscles and skeleton with great accuracy. He was also interested in the thoracic and abdominal viscera.

Opened to plate preceding p. 99.

This illustration of the thoracic and abdominal cavity shows the oesophagus as a straight tube joining the mouth cavity and the stomach. The intestinal coils he represents in several different forms, but fails to recognize the constant curve of the duodenum. The colon is fairly accurately represented and the appendix is shown.

The notes are in "mirror writing."

11. VESALIUS, ANDREAS (1514-1564).

De Humanis Corporis Fabrica Libri Septem.

Basileae, ex off. J. Oporini, 1543.

This masterpiece of Vesalius was the culmination of many years of dissection and teaching of anatomy. It is divided into seven books and is beautifully illustrated by Jan Kalkar, a pupil of Titian. It has never been completely translated. Vesalius has been called "The Reformer of Anatomy" and his book completely disposed of Galenical anatomy.

Opened at p. 365.

Book V is devoted to the abdominal viscera. The omentum and the general disposition of large and small bowel are illustrated and described. The vermiform appendix is portrayed, and described in the text. The "mesenteric gland" or pancreas is described, but the stomach, liver, spleen and kidneys are inadequately portrayed.

17th Century Anatomists

12. ASELLI, GASPAR (1581-1626).

De Lactibus . . .

Mediolan, apud J. B. Bidellum, 1627.

One of the post-Vesalian anatomists, Aselli was the first to oppose the Galenic idea that chyle passed directly through the mesenteric veins to the liver. It is said by some that he did not actually see the lacteals, merely inferring their existence. He nevertheless expounded strongly on this subject and subsequent anatomists substantiated his teaching.

His original striking colored woodcuts constitute the first use of this medium in anatomical illustration.

13. GLISSON, FRANCIS (1597-1677).

Anatomia Hepatis.

Londini, typ. Du-Gardianis, 1654.

Famed as anatomist, physiologist and pathologist. His most important contribution was an accurate *description of the capsule of the liver as well as of its blood supply*. He was a graduate of Cambridge and was for many years Professor of Physic at his Alma Mater. He was one of the founders of the Royal Society.

Opened at pp. 146-147: description of bile duct.

14. WIRSUNG, JOHANN GEORG (d. 1643).

Figura ductus cuiusdam cum multiplicibus suis ramulis nouiter in Pancreate . . . in diuersis corporibus humanis obseruati.

Paduae, 1642.

Wirsung, a prosector in anatomy at Padua during Vesling's time, discovered and described the pancreatic duct. The original plate showing this study is exceedingly rare, having been published as a single small oblong folio. Vesling incorporated this fact in his subsequent editions, giving the credit to Wirsung for the discovery. The plate shown was that reproduced in Ludwig Choulant's *History and Bibliography of Anatomic Illustration*, Chicago, Chicago University Press, [1920], p. 244.

15. WILARTON, THOMAS (1614-1673).

Adenographia, sive Glandularum Totius Corporis Descriptio . . .

Londini, J. G. imp. authoris, 1656.

One of a great group of 17th century anatomists. In this book, the first edition of which is shown, the various glands are described in greater detail than by previous authors.

Opened at pp. 132-133, to show illustration of duct of submaxillary gland.

16. STENON, NICOLAUS (Stensen, Niels) (1638-1686).

Observationes Anatomicae.

Lugd. Batav., P. de Graaf, 1680.

A priest and physician and an accomplished man in many fields: anatomy, physiology, geology and religion. In 1661 he discovered the duct of the

parotid gland in the sheep and this discovery was published in his *Observationes anatomicae* in Leyden in 1662

Opened to show illustrations opposite p. 37, of the duct of the parotid gland in sheep

17. HENLE, FRANZ NICHOLAS GUSTAV JACOB (1809-1885).

Symbolae ad Anatomiam Villorum Intestinalium . . .

Berolini, A. Hirschwald, 1837

One of the greatest histologists of his time and one of the most eminent contributors to anatomy of all time. His outstanding contribution to gastroenterology was the accurate description of the epithelium of the intestines and identification of the intestinal villi. The lymph vessels of the villi were recognized and their communication with the blood vessels of the mesentery was noted.

Opened at p. 37, to explanation of illustrations of epithelium of intestines. Illustration unfolded for view.

Chemical Physiology

18. VAN HELMONT, JOANNES BAPTISTA (1577-1641)

Ortus Medicinae . . .

Amsterodami, apud L. Elzevirium, 1648

A disciple of Paracelsus, van Helmont maintained the idea of "archaeus," the guiding spirit of all material processes. He observed the production of "gas" in the numerous chemical processes characteristic of "fermentations." This gas was a spirit liberated from various substances by the action of fermentation. Gastric digestion began in the stomach as a "fermentation" process which turned food into chyle. Further fermentation or chemical change occurred in the intestinal tract and transformed chyle into "crude blood," thence to the liver as "vital blood" and returned to the heart as the vital spirit or "archaeus."

Opened at pp. 202-203

van Helmont considered gastric juice to be "acid."

19. SYLVIUS (DE LA BOE), FRANCISCUS (1614-1672).

Praxeos Medicae Idea Nova Liber Primus . . .

Lugd Batav., apud viduam J. Le Carpenter, 1672

An expositor rather than an investigator, Sylvius divested physiological chemistry of the fantastic trappings given to it by Paracelsus and van Helmont. He was radical and heretical in teaching that "fermentation" was neither spiritual, supernatural nor archaic.

Opened at pp. 894-895 showing the passages illustrating his ideas on digestion, which he regarded as a chemical fermentation. He emphasized the rôle of saliva and pancreatic secretion, concerning the process of chymification as a chemical change of the properties of organic matter similar to the transmutations of inorganic matter.

20. DE GRAAF, REINIER (1641-1673).

De Succo Pancreatico. In his: *Opera Omnia*.

Lugd. Batav., Ex officina Hackiana, 1677, pp. 491-566.

de Graaf was a pupil of Franciscus Sylvius, and at the age of 23 made an investigation of the pancreatic juice, first published in Leyden in 1664. Using a quill as a cannula he examined the secretions of the pancreatic duct in a dog and determined, chiefly by taste, that the juice was "acid." He thought that bile and pancreatic juice mixed and effervesced in the duodenum.

Opened at p. 505: chapter on pancreatic juice. This is an early attempt at experimental physiology with modern scientific technique.

21. DE RÉAUMUR, RENÉ ANTOINE FERCHIAULT (1683-1757).

Sur la digestion des oiseaux.

In: *Mém. Acad. roy. d. sc.*, pp. 266-495, 1752.

The investigations of Réaumur were extremely diverse. He was the author of a great work on insects, and was the inventor of the thermometer which bears his name.

In his work on the digestion of birds he utilized the well-known habit of kites of rejecting particles which they could not digest and fed them wire mesh capsules in which portions of food were placed. He studied the solvent action of the gastric juice on these rejected foods and calculated that "putrefaction played no part in gastric digestion," thus refuting van Helmont and Sylvius.

22. SPALLANZANI, LAZARO (1729-1799).

Della Digestione degli Animali. In his: *Opere . . .*

Milani, Hoepli, 1932, vol. 1, pp. 214-396.

Spallanzani confirmed and extended Réaumur's work upon digestion. He discovered the digestive power of saliva, without recognizing its chemical nature. He also reaffirmed the solvent power of gastric juice. This work appeared in his *Fisica animali e vegetabili*, published in Venice in 1782.

The edition here shown is a modern one.

23. YOUNG, JOHN RICHARDSON (1782-1804).

An Experimental Inquiry into the Principles of Nutrition and the Digestive Process.

[Phila., T. & W. Bradford, 1805.]

This study was the graduating thesis of the young student at the University of Pennsylvania. In it he demonstrated that the flow of gastric juice and of saliva are associated and synchronous. He inferred that the acidity of the gastric secretion was due to phosphoric acid, a misconception corrected shortly after (1824) by Prout.

24. PROUT, WILLIAM (1785-1850).

On the Nature of the Acid and Saline Matters Usually Existing in the Stomachs of Animals.

In: Phil. Tr., Lond., 1821, pp. 45-49.

The first English physiological chemist and distinguished in this field by his discovery that the stomach contains free hydrochloric acid.

25. TIEDEMANN, FRIEDRICH (1781-1861) & GMELIN, LEOPOLD (1788-1853).

Die Verdauung nach Versuchen.

Heidelberg, K. Groos, 1826-7, 2v. in 1.

Opened at vol 1, pp. 272-273.

The authors of this classic monograph on digestion from the experimental viewpoint are contemporaries of Liebig and Wöhler and helped to found the remarkable German school of experimental physiology and of biological chemistry. They were the first to confirm Prout's claim that gastric juice contains free hydrochloric acid. They carried out numerous scientific experiments on digestion in various animals.

Experimental Physiology

26. MAGENDIE, FRANÇOIS (1783-1855).

Mémoire sur le vomissement.

Paris, Crochard, 1813.

The pioneer experimental physiologist of France, he was an ardent defender of animal experimentation and the founder of modern experimental pharmacology and demonstrated the action of many drugs, which he introduced into medical practice. His contributions are numerous, though Garrison says of him: "He discovered only isolated facts, did not try to connect them with one another by any special hypothesis, and so arrived at no important generalizations." He was the teacher of an illustrious pupil, Claude Bernard.

He made important investigations into the mechanism of deglutition and vomiting.

27. BEAUMONT, WILLIAM (1785-1853).

Experiments and Observations on the Gastric Juice.

Plattsburgh, Allen, 1833.

The unique accident which made possible the far-famed observations on the digestive processes in man is herein described. A Canadian half-breed, Alexis St. Martin, sustained a gunshot wound of the abdomen. He survived, but with a gastric fistula. Beaumont availed himself of this unusual opportunity to make the most significant contribution to gastric physiology prior to Pavlov. He found that digestive juices were secreted only when there was food in the stomach and that simple irritation of the mucous membrane would not initiate a flow of gastric juice. He studied the digestibility of various foods, the influence of emotions, of work and of illnesses upon gastric secretion and digestion.

28. BERNARD, CLAUDE (1813-1878).

Du suc pancréatique et de son rôle dans les phénomènes de la digestion.

In: Arch. gén. de méd. 4 ser. 19:60-81, 1849.

Trained in his youth by the Jesuits, Claude Bernard was a pharmacist and a playwright before turning to the pursuit of medicine. He was a pupil of Magendie and his natural talents as a pioneer in experimental physiology made possible his numerous contributions in that field.

His greatest gift to gastro-intestinal physiology was his work on the pancreatic juice (1849-1856), in which he showed the effect of the pancreatic secretion in emulsifying fats and in converting starches into sugars, also its solvent action on proteins.

29. SCHWANN, THEODOR (1810-1882).

Ueber das Wesen des Verdauungsprozesses.

In: Arch. f. Anat., Physiol. u. wissenschaftl. Med., pp. 90-138, 1836.

Schwann was a pupil of Mueller at Bonn and later taught at Louvain. Of his many medical discoveries the most notable was his classic cellular theory, published in 1839. He was also famous as an anatomist (sheath of Schwann) and as a physiologist.

In 1835 he discovered *pepsin* and demonstrated its ability to convert *albumin* into *peptones*. He also studied the secretion of bile and by means of a "deprivation fistula" was able to prove that bile was essential to digestion and its complete loss from the animal body fatal.

30. KÜHNE, WILLY (1837-1900).

Ueber das Trypsin (Enzym des Pankreas).

In: Verhandl. d. naturhist.-med. Vereins zu Heidelberg, (1876), n. F. 1:194-198, 1877.

Kühne was a pupil of Claude Bernard and was Professor of Physiology both in Amsterdam and in Heidelberg. His chief contributions to gastro-intestinal physiology are his *chemical studies of the intermediate digestion of proteins* and his discovery of the proteolytic enzyme in pancreatic juice, which he called "*trypsin*."

31. PAVLOV, IVAN PETROVICH (1849-).

The Work of the Digestive Glands. 2. English ed.

London, Griffen, 1910.

Pavlov, the son of a Russian priest, was a pupil of Heidenhain and of Ludwig. From the former he learned the technique of animal surgery and acquired an extraordinary ambidexterity. He was the founder of an eminent school of experimental physiologists.

Opened at pp. 16-17.

Illustration of his gastric pouch. By feeding a dog with such a pouch he was able to demonstrate "psychical secretion" of gastric juice. He showed that section of splanchnic nerves had no effect whereas section of the vagi would stop reflex gastric secretion.

He also studied pancreatic secretion and observed that pancreatic juice was activated by a duodenal substance which he named "enterokinase."

32. CANNON, WALTER BRADFORD (1871-).

The Movements of the Stomach Studied by Means of the Roentgen Rays.
In: Am. J. Physiol. 1:369-382, 1898.

Cannon conceived the idea of studying the movements of the gastrointestinal tract in animals experimentally *by means of the x-ray, utilizing bismuth subnitrate as an opaque medium.*

Opened at pp. 370-371. Plate demonstrating the original tracings of the stomach of the cat at successive intervals following a bismuth meal.

History of the Stomach Tube

33. HUNTER, JOHN (1728-1793).

A Case of Paralysis of the Muscles of Deglutition Cured by an Artificial Mode of Conveying Food and Medicines into the Stomach.

In: Tr. Soc. for Improvement of Med. & Chir. Knowledge, Lond., 1:182-188, 1793.

Hunter came to London in 1748 and studied anatomy under his brother William, and surgery under Cheselden and Pott. He is considered the founder of experimental and surgical anatomy. He has been hitherto regarded as the first to introduce artificial feeding through a flexible tube passed into the stomach, but there is now good evidence that Alexander Monro (secundus) employed this method prior to Hunter's time.

34. MONRO, ALEXANDER (secundus) (1733-1817).

Operations in Surgery (manuscript notes of a student), 1775-1790.

Monro was a member of the famous family of surgeons and anatomists whose lives are so closely connected with the development of the Medical School of the University of Edinburgh. He succeeded his father as Professor of Anatomy and Surgery there and lectured between 1759 and 1800.

The manuscript here presented is in the hand of Samuel Davidson, who was a pupil of Monro between 1775 and 1790. These notes, taken at Monro's lectures, contain a description of a disease of the oesophagus with constriction and narrowing, as well as a symptom complex closely resembling cardiospasm.

For these conditions Monro recommended the passage of bougies, and suggested that by passing a hollow flexible tube, the purpose of the bougie and a means of feeding the patient would be provided by one instrument.

35. LARREY, DOMINIQUE JEAN (Baron) (1766-1842).

Mémoires de chirurgie militaire et campagnes.

Paris, J. Smith, 1812.

Baron Larrey, the greatest French military surgeon of his time and a favorite of Napoleon during his campaigns, devised many operations and contributed much to military surgery.

He was the first to use intubation of the oesophagus in cases of gunshot wounds, devising the method as a means of feeding the famous Marshal, Baron Desault, who was suffering from paralysis of the oesophageal muscles as a result of a penetrating bullet wound.

Opened at pp. 146-147.

36. PHYSICK, PHILIP SYNC (1786-1837).

Account of a New Mode of Extracting Poisonous Substances from the Stomach.

In: Eclectic Report. & Anal. Rev. 8:111-113, 1813.

Physick, Professor of Surgery at the University of Pennsylvania, is sometimes called "The Father of American Surgery."

He is remembered as the first American to wash out the stomach with a tube and syringe. As far as Physick knew, the idea and method were original with him (1800). He later learned that Alexander Monro (secundus) had previously used the same procedure (1797) and formally acknowledged the priority.

37. JUKES, EDWARD (fl. 1822).

New Means of Extracting Opium, &c. from the Stomach.

In: London M. & Phys. J. 47:384-389, 1822.

Jukes and Francis Bush wrote simultaneously on the subject of lavaging the stomach by means of a hollow flexible gum tube in cases of opium poisoning. Neither writer knew of the work of the other, nor did they know that Physick, an American (1800) had utilized intubation in a very similar manner.

A letter by Bush: "On removing opium from the stomach with a syringe" will be found on p. 541 of this journal.

38. KUSSMAUL, ADOLF (1822-1902).

[Mechanische Behandlung der Magenerweiterung].

In: Tageblatt d. Versamml. deutsch. Naturf. u. Aerzte. 41:41-42, 1867.

Kussmaul studied at Heidelberg and began his medical career as an army surgeon. He practiced medicine in the country for a short time and then went to Würzburg to study under Virchow.

He was the first to use lavage in cases of gastric dilatation (pyloric stenosis) and made the first attempts at oesophagoscopy and gastroscopy. His report on the use of gastric intubation in three cases of dilatation is found in the above note.

39. EWALD, CARL ANTON (1845-1915).

Beiträge zur Physiologie und Pathologie der Verdauung.

In: Virchow's Arch. 101:325-375, 1885.

Ewald was an assistant of Frerichs and was Senator's successor at the Kaiserin Augusta Hospital. He is known for his valuable contributions to the knowledge of disorders of digestion. He published his work on intubation for examination of the stomach in 1875, and in conjunction

with Boas, his description of the "test breakfast" in 1885. This simple meal of bread and tea became the standard test meal and is still in universal use.

40. EINHORN, MAX (1862-).

Die neueren Methoden der Magenuntersuchungen.

Reprinted from: New Yorker med. Monatschr. 1:113-122, 1889.

Einhorn was a graduate of the University of Berlin and later became a practitioner and teacher in New York. He was the inventor of many ingenious diagnostic devices, among them the stomach bucket, in 1890, and the duodenal bucket, in 1908.

*Classical Descriptions of
Gastric Ulcer*

41. DONATUS, MARCELLUS (latter half of 16th century).

De Historia Medica Mirabili Libri Sex.

Francofurti ad Moenum, impensis J. J. Porsii, 1613.

Donatus studied medicine at Padua. He practiced in Venice and later went to Mantua, where he became Secretary of State and was made a Count.

He published in Mantua in 1586 his *De Historia Medica*, in which is found the earliest known report of a gastric ulcer discovered at autopsy. The edition here shown is the one published in Frankfurt after his death. Opened at pp. 308-309.

42. BONET, THEOPHILUS (1620-1689).

Sepulchretum sive Anatomica Practica. . . .

Genevae, Cramer et Perachon, 1700.

Bonet was a member of a celebrated medical family of Geneva. He graduated in medicine in 1643 and returned to Geneva to practice. He soon became renowned as a prognostician and therapist.

Opened at p. 1123.

Obs. XXV is an excellent account of the history of a doctor's wife, 18 years old, who after passing blood in her stools died of peritonitis on the fourth day of her illness. This was shown by post-mortem examination to be due to the perforation of a gastric ulcer.

43. BAILLIE, MATTHEW (1761-1823).

The Morbid Anatomy of Some of the Most Important Parts of the Human Body. 2. ed.

Lond., J. Johnson, 1797.

Baillie was urged to study medicine by his uncle, the celebrated William Hunter, and became a pupil of Hunter and of Morgagni. He was an eminent practitioner in London, as well as an astute student of pathology. His works show a systematic attempt to correlate pathology and clinical medicine.

In the book exhibited, which was first published in 1793, he gives the first clear description of the morbid anatomy and the clinical symptoms of gastric ulcer.

Opened at pp. 140-141.

44. ABERCROMBIE, JOHN (1780-1844).

Pathological and Practical Researches on Diseases of the Stomach, the Intestinal Canal, the Liver, and other Viscera of the Abdomen.

Edinb., Waugh & Innes, 1828.

Abercrombie received his doctor's degree at Edinburgh in 1803 and after spending a year in further study at St. George's Hospital, London, returned to Edinburgh to practice. He kept with scrupulous care a record of every case of scientific interest that came before him and many of these observations are incorporated in his two principal works.

Opened at pp. 34-35 showing a description of a case of gastric ulcer, in which the symptoms of perforation and hemorrhage are noted and excellent recommendations concerning treatment are made.

45. CRUVEILHIER, JEAN (1791-1874).

Maladies de l'estomac. In his: Anatomie pathologique du corps humain.

Paris, Baillière, 1835-42, Vol. 2.

Cruveilhier graduated in 1816 from the University of Paris, where he was a pupil of Dupuytren. He returned to Limoges to practice, but was persuaded to return to Paris as Professor of Pathology.

His *Anatomie pathologique du corps humain* is a remarkably illustrated atlas of gross pathology. Plates showing ulcers of the stomach are here shown. It is often claimed that his was the first pathologic description and depiction of gastric ulcer, and the name "Cruveilhier's ulcer" was much in use in France. However, he was preceded by Abercrombie and Matthew Baillie. Cruveilhier is rightly credited with the differentiation of benign gastric ulcer and carcinoma, but microscopic studies are lacking.

46. DIEULAFAY, GEORGES (1839-1911).

Exulceratio simplex, diagnostic anatomique et diagnostic clinique.

In his: Clinique médicale de l'Hôtel-Dieu de Paris, 2:23-62, 1897-98.

Dieulafoy was a distinguished practitioner of Paris but although an alert and intelligent physician and an excellent teacher he was not a profound scientific investigator. His work on internal medicine was very readable and popular.

He differentiated acute gastric ulcer which he called "exulceratio simplex" from chronic gastric ulcer, "ulcus simplex" of Cruveilhier. He advanced a toxic-infectious theory of the etiology of acute ulcers and thought that they were the precursors of chronic ulcers. Among his case reports are instances of fatal gastric hemorrhage from acute gastric ulceration at the fundus.

*Duodenal Ulcer; Typhoid and Typhus Fevers
Pathological Anatomy*

47. HAMBERGER, GEORGIUS ERHARDUS (1697-1755).

De Ruptura Intestini Duodeni.

Jenae, lit. Ritterianis, [1746].

Hamberger received his doctor's degree at Jena in 1721 and was later Professor of Chemistry, and practiced at that University.

He described, in 1746, the case of a young woman who, after gathering plums in the morning, was seized with violent abdominal pains and died in a short time. Upon opening the abdomen post-mortem Hamberger found gas, fluid, and in the duodenum a perforation the size of a pea. This is probably the first reported case of a *perforated duodenal ulcer*.

48. CURLING, THOMAS BLIZARD (1811-1888).

On Acute Ulceration of the Duodenum in Cases of Burn.

In: Med.-Chir. Tr., Lond., 25:260-281, 1842.

A prominent London surgeon of the 19th century. He became assistant surgeon at the London Hospital at the age of 21, and was associated with that institution until 1869. He is rated as the first man to describe *myxoedema*.

In 1842 Curling pointed out the association between severe superficial burns and duodenal ulcer, and reported 12 cases of this kind. Ulcers of this type are called "Curling's Ulcer."

49. MOYNIHAN, BERKELEY GEORGE ANDREW MOYNIHAN, 1st baron (1865-).

On Duodenal Ulcer and its Surgical Treatment.

In: Lancet, 2:1656-1663, 1901.

The son of an army officer, he distinguished himself as a military surgeon. His contributions to abdominal surgery are numerous and important.

His great pioneer work in surgery was his account of the characteristics and symptoms and surgical treatment of duodenal ulcer. Isolated pathological reports of this condition had occasionally been noted and been lost in obscure literature but its occurrence, remarkable frequency, and clinical characteristics were first adequately described by this author.

50. BRETONNEAU, PIERRE (1778-1862).

Notice sur la contagion de la dothinentérite; lue à l'Académie Royale de Médecine, le 7 juillet 1829.

In: Arch. gén. de méd. 21:57-78, 1829.

Bretonneau wrote on typhoid fever in 1829, describing at that time the lesions in Peyer's patches. He also anticipated the differentiation of typhoid and typhus fevers and was an early supporter of the germ theory of disease.

51. LOUIS, PIERRE CHARLES ALEXANDRE (1787-1872).

Recherches anatomiques, pathologiques et thérapeutiques sur la maladie connue sous les noms de gastro-entérite, fièvre putride, adynamique, ataxique, typhoïde. . . .

Paris, Baillière, 1829.

This is the first time that the name *typhoid* fever rather than *dotted-enteritis* was applied to this disease.

Louis was famous as a teacher of American physicians. Through his influence on such men as O. W. Holmes, the Shattucks, Gerhard and others, he extended a dominating influence upon medicine in the United States.

52. GERHARD, WILLIAM WOOD (1809-1872).

On the Typhus Fever which Occurred at Philadelphia in the Spring and Summer of 1836. . . .

In: Am. J. M. Sc., 19:289-322, 1827.

After graduating from the University of Pennsylvania in 1831, Gerhard studied in Paris with Pierre Louis. Louis had studied typhoid fever on the continent and had recognized it as a general intestinal inflammation. Gerhard, returning to Philadelphia, soon demonstrated that a continued fever raging here was identical with the typhoid fever in France. In 1836 he studied an epidemic of typhoid fever and was able thereafter to establish as separate entities *typhoid* and *typhus* fever.

53. MORGAGNI, GIOVANNI BATTISTA (1682-1771).

De Sedibus et Causis Morborum. . . .

Venetiis, ex typ. Remondiniana, 1761. 2 vols. in one.

Morgagni received his medical education at Bologna and was much influenced by his teacher, Valsalva. At the age of 29 he was called to Padua as Professor of Surgery to fill the chair once occupied by Vesalius. His life was spent apart from the affairs of the world in indefatigable labors in dissection, clinical consultations and teaching with no thought of self interest or renown.

The works of Morgagni were not published until his seventy-ninth year, when they appeared in the form of five books of informal letters. This work constitutes the foundation of modern pathologic anatomy, bringing about for the first time a systematic correlation of clinical data and post-mortem findings. He was the first to describe the clinical and pathologic features of acute yellow atrophy of the liver. In 1733 Morgagni described a case of duodenal ulcer complicating ulcers of the stomach.

This book is opened at vol. 2, p. 73, to a section in which this very astute clinician and pathologist describes and discusses a case of "emotional jaundice."

54. BAILLIE, MATTHEW (1761-1823).

Of a Remarkable Transposition of the Viscera.

In: Phil. Tr., London, 78:483-489, 1788.

First description of transposition of the viscera as a pathologic entity.

55. BRIGHT, RICHARD (1789-1858).

Cases and Observations Connected with Disease of the Pancreas and Duodenum.

In: Med.-Chir. Tr., Lond., 18:1-56, 1833.

Bright was a pupil of Sir Astley Paston Cooper. He was physician to Guy's Hospital for 23 years and the ward where he made his rounds still bears his name. The leading consultant of London in his time, he was known for his dissection of autopsy material as well as for the practice of clinical medicine.

He described essential nephritis and first differentiated between cardiac and renal dropsy. In the field of gastroenterology his clinical descriptions and pathologic studies in pancreatitis and diabetes are classic gems of medical literature.

56. _____.

Account of a Remarkable Misplacement of the Stomach.

In: Guy's Hosp. Rep., 1:598-603, 1836.

The first pathological and clinical description of a congenital thoracic stomach. Clinical knowledge of this remarkable condition is just appearing in very recent medical literature.

*Megacolon; Congenital Pyloric Stenosis;
Appendicitis*

57. RUY SCH, FREDERICUS (1638-1731).

Observationum Anatomico-chirurgicarum Centuria.

In his: Opera Omnia, Amstelodami, apud Janssonio-Waesbergios, 1737, vol. 1, 86.

A pupil of Sylvius, Ruysch, like the physicians of his time, had wide interests such as botany, chemistry, numerology. He was primarily an anatomist and pathologist; his name is associated with the practice of injecting arteries with colored wax and he is remembered for the excellence of his anatomical illustrations.

Observatio XCII. *Enormis intestini coli dilatatio.* Ruysch was probably the first to report (1691) the findings of an enormous dilatation of the colon in a girl fifteen years of age. The specimen is apparently one of "idiopathic congenital dilatation of the colon" described clinically, *de novo*, almost 200 years later by Hirschsprung.

58. PARRY, CALEB HILLIER (1755-1782).

Collections from the Unpublished Medical Writings of. . . .

London, Underwoods, 1825, vol. 2, pp. 369-380.

Parry was a close friend of Edward Jenner and a contemporary of many of England's famous men of medicine. He was an accomplished clinician, a keen observer and an original thinker. He confirmed Heberden's work on angina pectoris and gave an accurate account of exophthalmic goitre years before that of Graves or of Basedow. He described an *unusual case of idiopathic dilatation of the colon* probably a century earlier than that of Hirschsprung.

Opened at pp. 372-373.

59. HIRSCHSPRUNG, HARALD (1831-1916).

Stuhlträgheit Neugeborener in Folge von Dilatation und Hypertrophie des Colons.

In: Jahrb. f. Kinderh. 27:1-7, 1888.

Hirschsprung was Chief of Staff of the Children's Hospital of Copenhagen from 1870. Besides his original description of *dilatation and hypertrophy of the colon in the newborn*, he published papers on congenital occlusion of the oesophagus and of the duodenum, acute rachitis, rheumatic myositis in children, etc.

60. LEWITT, WILLIAM (fl. 1867).

Enlargement of the Colon.

In: Chicago M. J., 24:359-361, 1867.

William Lewitt, otherwise unknown in American medicine, was the first American to describe, in 1867, a case of congenital dilatation of the colon, with clinical features and post-mortem studies. This publication antedates that of Hirschsprung by almost 20 years. Lewitt was at that time a demonstrator in Anatomy at Rush Medical College, but no further biographical data are available.

61. BEARDSLEY, HEZEKIAH (1748-1790).

Case of a Schirrhous in the Pylorus of an Infant.

In: Cases and Observations by the Medical Society of New-Haven County, pp. 81-84, 1788.

This is said by Osler to be the earliest volume of medical transactions published in America. Beardsley, an early member of the Society, published in its transactions his observations upon a case of congenital obstruction of the pylorus in a newborn infant. He attended this case for three years and describes with great accuracy the clinical features of the disease and the results of the autopsy performed two days after the death of the infant. His paper was the first report of its kind in America and is contemporary with two similar and independent descriptions in the continental literature.

62. WILKS, SIR SAMUEL (1821-1911).
Lectures on Pathological Anatomy.
London, Longman, 1859.

These studies are the result of a life devoted to clinical medicine and clinical pathology at Guy's Hospital. Among the many brilliant and original descriptions in this volume is one of a type of ulceration of the colon which had hitherto not been differentiated from dysentery or similarly identified forms of colitis. Wilks is here undoubtedly describing a specimen of *severe ulcerative colitis* of the type today classed as "non-specific."

Opened at p. 301.

63. FERNELIUS AMBIANUS, JOANNES (1497-1558).
Universa Medicina.

Francofurti ad Moenum, apud A. Wechelum, 1577.

Fernel, besides being famed as a medical practitioner, was active in many fields of research, being the first to measure accurately a degree at the meridian.

Opened at Book VI, p. 218.

The accompanying selection from his *Universa Medicina* is probably the first description of acute appendicitis with perforation. The only doubt hinges on whether the terms *caecum intestinum* refers to the caecum or the appendix, as anatomists of that time used the term to apply to both structures.

64. HEISTER, LAURENZ (1683-1758).
Medical, Chirurgical, and Anatomical Cases and Observations.
Translated . . . by George Wirgman.
London, printed by J. Reeves for C. Hitch [et al.], 1755.

Heister was a widely known man and led a very active and fruitful life. He studied first at Giessen, then went to Holland where he studied anatomy and received his doctor's degree from Harderwyck in 1708. Lectured on anatomy and surgery at Amsterdam and was a surgeon in the Dutch army. Later studied in London and Paris, and eventually became Professor of Anatomy at Altdorf, and later at Helmstädt. His surgical works are numerous and contain a wealth of information. The first German edition of his *Observations* was published at Rostock in 1753.

The accompanying translation is opened at p. 136, Observation CX, "Of an abscess in the veriform process of the caecum." This is the first description of a case of appendicitis.

65. PARKINSON, JAMES (1755-1824).
Case of Diseased Appendix Vermiformis.
In: Med.-Chir. Tr., Lond., 3:57-58, 1816.

Parkinson was the son of a physician and one of a cultured and educated family. Little is known of his education, but he was engaged in

practice in 1785 and attended John Hunter's lectures in surgery during that year. He will be remembered in the main for his classical description of paralysis agitans. He was also a reformer and political agitator. One of the early classical descriptions of appendicitis, the first one in English, is written by this author. He recognized perforation as the cause of death in this condition.

66. FITZ, REGINALD HEBER (1843-1913).

Perforating Inflammation of the Vermiform Appendix, with Special Reference to its Early Diagnosis and Treatment.

In: Boston M. & S. J., 115:13, 1886.

Fitz received his degree at Harvard in 1868. He spent two years abroad with Rokitansky, Oppolzer and Skoda in Vienna, and with Cornil in Paris. He found his greatest inspiration in Virchow, whose theory of cellular pathology he introduced into the United States. In 1870 he returned to Boston and led an active life in practice and teaching.

This classical article on appendicitis was presented before the Association of American Physicians in 1886. Here was expounded for the first time a clear picture of the clinical course and diagnostic signs of appendicitis, together with its pathologic changes. Fitz advocated immediate operation as the only rational means of saving life.

Abdominal Surgery

67. BOBBS, JOHN STOUGH (1809-1870).

A Case of Lithotomy of the Gall Bladder.

In: Indiana M. J., 18:177-180, 1899.

Bobbs, a pioneer surgeon of Indiana, read medicine with Martin Luther of Harrisburgh, Pa. and took a course of lectures at Jefferson Medical College in Philadelphia. He soon took high rank both as a physician and surgeon. When the Medical College of Indiana was organized, he was elected Professor of Surgery and later Dean of the Faculty. The latter part of his life was devoted mainly to surgery, and as an operator he was bold and original.

He performed the first cholecystotomy in 1867. The account of it was published originally in the *Transactions of the Indiana State Medical Society* in 1868 and the above reference is a reprint, somewhat abridged.

68. BILLROTH, CHRISTIAN ALBERT THEODOR (1829-1894).

Ueber die Resection des Oesophagus.

In: Arch. f. klin. Chir., 13:65-69, 1872.

Billroth was educated at Greifswald, Göttingen and Berlin, receiving his doctor's degree from the latter university in 1852. After a year of extensive travel he returned to Germany to become an assistant in Langenbeck's clinic in Berlin. He next taught in Zürich and finally went to Vienna, where he remained as director, surgeon and teacher to

the end of his life. He was a thoroughly trained pathologist and surgeon. He served as an army surgeon in the Franco-Prussian War and distinguished himself in the surgery of gunshot wounds.

Billroth was known as the pioneer in "visceral surgery" and was the first to resect the oesophagus in 1872. He is renowned primarily for his successful resection of the stomach for carcinoma in 1881.

He was the teacher of Wölfler, Czerny, Gussenbauer, von Eiselsberg and von Mikulicz.

69. WÖLFLER, ANTON (1850-1917).

Gastro-Enterostomie.

In: Centralbl. f. Chir., 8:705-708, 1881.

Wölfler was a pupil of Billroth, and later became Professor of Surgery at Graz and at Prague.

His most important contribution to surgery was made while he was an assistant to Billroth, at which time he performed the *first gastro-enterostomy*. This operation was performed in a case of inoperable carcinoma of the pylorus in 1881.

70. VON VOLKMANN, RICHARD (1830-1889).

Ueber den Mastdarmkrebs und die Exstirpation recti.

In: Samml. klin. Vortr. 131 (Chir. 42), 1878.

von Volkmann was the son of a well known physiologist and professor of surgery at Halle. He graduated in medicine from Berlin in 1854 and became an assistant in the surgical clinic of Blasius. He later returned to Halle to practice and to teach surgery.

He is remembered largely because of his description of ischemic contraction, but it must be noted that he was the first to perform a resection of the rectum for carcinoma in 1878.

71. KRASKE, PAUL (1851-1930).

Zur Exstirpation hochsitzender Mastdarmkrebse.

In: Arch. f. klin. Chir., 33:563-573, 1886.

Kraske was a student at Leipzig and at Halle during the earliest days of Listerism. As an assistant to Professor von Volkmann he had the opportunity to see the beginnings of the advance in abdominal surgery made possible by anaesthesia and asepsis.

The fame of Kraske as a surgeon rests solely upon his original method of resecting the rectum for carcinoma and implanting the lower cut end of the colon into the same incision.

Development of Radiography

72. CANNON, WALTER BRADFORD (1871-).

The Movements of the Stomach Studied by Means of the Roentgen Rays.

In: Am. J. Physiol., 1:369-382, 1898.

This constitutes the pioneer attempt to apply the recently discovered radiographic technique to gastro-intestinal physiology. The use of bismuth subnitrate was not only a successful technical innovation, but it made possible physiological studies on peristalsis and intestinal function never before envisioned in a normal animal. (See also item no. 32.)

73. ROUX, JEAN CHARLES & BALTHAZARD, VICTOR (1872-).

Etude du fonctionnement moteur de l'estomac à l'aide des rayons de Röntgen.

In: Arch. de physiol., 5. ser., 10:85-94, 1898.

This article is the earliest to incorporate the idea of Cannon and to apply the bismuth contrast meal to human beings. Unfortunately the amount of bismuth subnitrate used was insufficient. This suggestion was but little improvement on the filled capsules, metal foreign bodies, coiled metal springs, and bags filled with solution of lead acetate which were among the fantastic devices for visualizing the stomach during this initial period.

74. WILLIAMS, FRANCIS HENRY (1852-).

The Roentgen Rays in Medicine and Surgery.

N. Y., Macmillan, 1901.

Williams was educated at the Massachusetts Institute of Technology and at Harvard Medical School. He studied in Europe for two years and returned to enter general practice in 1879. He then took up the study of roentgenology to which he devoted himself thereafter. He taught X-ray diagnosis and therapy at Harvard and wrote much on the subject.

The textbook here shown, opened at p. 361, is one of the earliest in which the opaque meal was expounded as a practical mode of gastro-intestinal diagnosis. Here for the first time bismuth was used in sufficient concentration for the outline and study of the normal human stomach. This American pioneer work antedated by three years that of Rieder of Germany.

75. RIEDER, HERMANN (1858-1932).

Radiologische Untersuchungen des Magens und Darmes beim lebenden Menschen.

In: München. med. Wchnschr., 51:1548-1551, 1904.

Studied in Vienna, Heidelberg and Munich, at which latter place he received his doctor's degree. Served on the staff of the Munich Hospital,

the Medico-Clinical Institute, and under the renowned Ziemssen. He was attracted by Röntgen's discovery (1895) to such an extent that in 1901 he was already beginning to study the form and function of the alimentary tract of man by means of radio-opaque meals of bismuth. This article is the first accurate description of the radiology of the normal alimentary tract of man. It is a classic study, exact, detailed, perfect in observation.

76. HEMMETER, JOHN CONRAD (1864-1931).

Neue Methoden zur Diagnose des Magengeschwurs

In: Arch. f. Verdauungschr., 12:356-363, 1906.

Hemmeter received his early training, especially in music, in Germany but studied medicine at the University of Maryland. He returned to Europe in 1887 to pursue the study of medicine. He was interested in diseases of the digestive tract and this led to his study of roentgenology and gastroenterology.

He was the first to devise a kymographic method for studying gastric peristalsis, and is said by many to have been the first physician in America to suggest the use of an opaque medium for roentgenologic study of the stomach. The above article constitutes the first visual representation of gastric ulcers by means of this new technique.

77. HOLZKNECHT, GUIDO (1872-1931) & JONAS, SIEGFRIED (1874-).

Die radiologische Diagnostik der intra- und extra-ventrikulären Tumoren und ihre spezielle Verwertung zur Frühdiagnose des Magencarcinoms.

Wien, Perles, 1908.

Holzknecht studied in Strassburg and Königsberg and received his doctor's degree in Vienna in 1901. He then became an assistant in Nothnagel's clinic where he became interested in roentgenology. He studied this subject ardently for many years and was famed as a teacher and as a pioneer in the development of the clinical use of the X-ray. He was the first to devise a dosage table for X-ray therapy and did much to clarify the problems of the diagnosis of visceral disease.

His work on tumors of the stomach deals particularly with the roentgen diagnosis of carcinoma of the stomach.

78. HAUDEK, MARTIN (1880-1931).

Die Röntgendiagnose des kallösen (penetrierenden) Magengeschwürs und ihre Bedeutung.

In: München. med. Wochenschr., 57:2463-2467, 1910.

Haudek was educated in Vienna, where he entered the Allgemeine Krankenhaus in 1905. He later became an adjunct in roentgenology there. He was most interested in the diagnosis of diseases of the stomach and duodenum and was the first to describe the "niche symptom" in gastric ulcer in 1910.

79. COLE, LEWIS GREGORY (1874-).

The Diagnosis of Post-pyloric (Duodenal) Ulcer by Means of Serial Radiography.

In: Tr. XVII. Internat. Cong. Med. (1913), Lond., Sect. XXII., part II (Radiology), pp. 77-81, 1914.

Cole graduated from the College of Physicians and Surgeons in 1898 and was Professor of Roentgenology at Cornell Medical College from 1913 to 1920.

A very few years after Moynihan's description of duodenal ulcer (1905), Cole's work describing the "Pileus duodeni" appeared. This pioneer work on the roentgenography of the duodenal cap remains a classic contribution.

"TWO-AND-A-HALF-FOOT SHELF" OF A GASTROENTEROLOGIST

This represented a choice of some (not all) of the modern classics considered essential to a proper understanding of gastroenterology and its relation to internal medicine. The books were chosen by one of us (Burrill B. Crohn).

ALVAREZ, WALTER CLEMENT

Nervous indigestion.

New York, Hoeber, 1930.

ALVAREZ, WALTER CLEMENT

The mechanics of the digestive tract. 2. ed.

New York, Hoeber, 1928.

CANNON, WALTER BRADFORD

Bodily changes in pain, hunger, fear and rage. 2. ed.

New York, Appleton, 1929.

CANNON, WALTER BRADFORD

The mechanical factors of digestion.

New York, Longmans, 1911.

CARLSON, ANTON JULIUS

The control of hunger in health and disease.

Chicago, University of Chicago Press, 1916.

CARMAN, RUSSELL DANIEL

} The Roentgen diagnosis of diseases of the alimentary canal. 2. ed.
Philadelphia, Saunders, 1920.

GASKELL, WALTER HOLBROOK

The involuntary nervous system.

London, Longmans, 1916.

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Constipation and allied intestinal disorders. 2. ed.
London, Frowde, 1919.

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The Goulstonian lectures on the sensibility of the alimentary canal.
London, Frowde, 1911.

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Gastric and duodenal ulcer.
London, Milford, 1929.

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Disease of the pancreas. 2. ed.
Philadelphia, Lippincott, 1910.

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The principles and practice of medicine. 11. ed.
New York, Appleton, 1930.

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The work of the digestive glands; translated into English by W. H. Thompson. 2. ed.
London, Griffin, 1910.

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Symptoms of visceral disease. A study of the vegetative nervous system in its relationship to clinical medicine. 4. ed.
St. Louis, Mosby, 1930.

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The colon, rectum and anus.
Philadelphia, Saunders, 1932.

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Diagnosis and treatment of diseases of the stomach with an introduction to practical gastro-enterology.
Philadelphia, Saunders, 1927.

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Diseases of the liver, gall-bladder and bile-ducks. 3. ed.
London, Macmillan, 1929.

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Die Röntgendiagnostik der Magen-und Darmkrankheiten. 3. Aufl.
Berlin, Urban, 1927.

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Manchester (Eng.), University Press, 1915.

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- Sihle, M. *Über das Weltbild des Arztes.*
Wien, Weidmann, [1934], 241 p.
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London, Heinemann, 1934, 387 p.
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N. Y., Commonwealth Fund, 1934, 177 p.
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Paris, Doin, 1934, 102 p.
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Bristol, Wright, 1934, 1112 p.
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Paris, Masson, 1934, 3 v.
- Wertham, F. & Wertham, (Mrs.) F. *The brain as an organ.*
N. Y., Macmillan, 1934, 538 p.
- Wigglesworth, V. B. *Insect physiology.*
London, Methuen, [1934], 134 p.
- Wile, I. S. *Handedness, right and left.*
Boston, Lothrop, 1934, 439 p.
- Williams, J. F. & Brownell, C. L. *The administration of health and physical education.*
Phil., Saunders, 1934, 598 p.
- Williams, K. G. L. *Anaesthesia and analgesia in labour.*
Balt., Wood, 1934, 96 p.
- Wolff, E. *A pathology of the eye.*
London, Lewis, 1934, 283 p.
- Wright, S. *Applied physiology.* 5. ed.
London, Milford, 1934, 604 p.

BIBLIOGRAPHICAL DEPARTMENT

In the *Bulletin* for November, 1933, a brief sketch of the work of the Bibliographical Department was given, also a

list of bibliographies compiled from 1927 through March, 1933. The list below consists of those compiled during the remainder of 1933. The dates following the titles indicate the years covered in the literature.

Copies of these bibliographies are catalogued and kept in the Library. They may be consulted by anyone who wishes to see them but may not be taken from the Library.

Besides compiling bibliographies the department also checks and corrects those already compiled by physicians and puts them into the required form for publication. It also edits and types medical papers. All this type of work is classed under general bibliographical service and a charge of \$1.50 an hour is made for research and editing and \$1.00 an hour for typing.

In addition to this service, translating and abstracting are done. The price of full translation is based on the number of words in the original article and the rate is \$7.50 per 1,000 words. This price includes a typed copy and one carbon. Abstracting is done on an hourly basis, as is oral translation, at a rate of \$1.50 an hour. Articles in English are not abstracted.

Fellows of the Academy may have all work done at half these rates.

BIBLIOGRAPHIES COMPILED DURING 1933

595. List of bibliographies compiled by the Bibliographical Dept. (1927-date)
596. Cost of training nurses (1926-1932)
597. Bibliography of William Gray Schauffler (1901-1923)
598. Hemophilia (selected English references only)
599. Ectopic ureteral openings (1926-1932)
600. Tuberculosis of the middle ear and mastoid (1924-1933)
601. Postural hypotension (1928-1932)
602. Ciliary processes in the iris (and pupillary area) (1897-1933)
603. Gonioscopy (1900-1930)

- 604. Saponin (1927-1933)
 - 605. Experimental production of tumors by means of tomato juice (1931-1933)
 - 606. Involvement of the larynx in agranulocytic angina (1922-1933)
 - 607. Divergence paralysis (1900-1933)
 - 608. Cysts of the vitreous (1899-1933)
 - 609. Acute mesenteric adenitis (1900-1933)
 - 610. Sinusitis in relation to renal diseases (1910-1933)
 - 611. Calcinosis universalis (English references only) (1923-1933)
 - 612. Cultures and tests made from extracted dead teeth (1925-1933)
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PROCEEDINGS OF ACADEMY MEETINGS

JANUARY

ANNUAL MEETING

January 3

- I. EXECUTIVE SESSION—a. Reading of the minutes; b. Report of the Nominating Committee; c. Election of Members; d. Presentation of diplomas
- II. PRESENTATION OF ANNUAL REPORTS—(read by title) The Council, The Trustees, The Treasurer, Committees.
- III. PAPERS OF THE EVENING—a. *Address of the Retiring President*, Standards—Achievements, Bernard Sachs; b. *Address of the Incoming President*, Problems facing medicine, Eugene H. Pool; c. Consideration of the Workmen's Compensation Laws, Justine Wise Tulin, Assistant Corporation Counsel, City of New York; d. Medical care and hospitalization of the indigent sick, Hon. Herbert Brownell, Jr., Member, New York State Assembly.

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

January 17

THE FOURTH HARVEY LECTURE, "Processes of Urine Formation in the Amphibian Kidney," Alfred N. Richards, Professor of Pharmacology, University of Pennsylvania.

This lecture takes the place of the second Stated Meeting of the Academy for January.

SECTION MEETINGS

SECTION OF DERMATOLOGY AND SYPHILOLOGY—January 2

- I. PRESENTATION OF CASES FROM VANDERBILT CLINIC.
- II. DISCUSSION OF SELECTED CASES.

SECTION OF SURGERY—January 4

- I. READING OF THE MINUTES.

- II. PRESENTATION OF CASES—a. Successful suture of penetrating wound of the heart, Joseph B. Stenbuck; b. Presentation from the surgical service of the Knickerbocker Hospital; 1. Unusual angioma of the back (traumatic), A. Joseph Delaney (by invitation); 2. Simple fracture of the coronoid process of the ulna, D. Rees Jensen (by invitation); 3. Gas gangrene. Two cases, Edward R. Easton; 4. Operative therapy for unresolved

hemothorax, John V. Bohrer; 5. Cholecystitis, operation, absence of gall bladder, Stenosis of common duct from contiguous cicatricial tissue, Ellsworth Eliot, Jr.; 6. Five cases illustrating paper of the evening (a).

III. PAPERS OF THE EVENING—*a.* Refrigerated skin grafts, Jerome P. Webster; *b.* Perforated ulcers of the duodenum, Edward C. Brenner.

IV. GENERAL DISCUSSION—John Staige Davis, Baltimore (by invitation) Charles Gordon Heyd.

COMBINED MEETING OF THE SECTION OF NEUROLOGY AND PSYCHIATRY and THE NEW YORK NEUROLOGICAL SOCIETY—January 8

I. PAPERS OF THE EVENING—*a.* Creatine metabolism in muscle disease. The clinical significance of the effect of glycine on the creatinuria and on creatine tolerance, A. T. Milhorat (by invitation), Harold G. Wolff (by invitation); Discussion, E. Brand; *b.* Experimental analysis of the functions of the frontal association areas in primates, Carlyle F. Jacobsen, Yale University (by invitation); Discussion, Frederick Tilney; *c.* Some sidelights in the psychology of murder, Gregory Zilboorg; Discussion, Vernon C. Brantham, Deputy Commissioner, Department of Correction, State of New York, Israel Strauss.

SECTION OF HISTORICAL AND CULTURAL MEDICINE—January 9

I. READING OF THE MINUTES.

II. PAPERS OF THE EVENING—*a.* The medical man and the witch towards the close of the XVI century, Gregory Zilboorg; *b.* Dr. Horace Wells and the discovery of anesthesia, Walter R. Steiner, Hartford.

III. GENERAL DISCUSSION—To be opened by Bernard Sachs.

IV. EXECUTIVE SESSION—Appointment of nominating committee.

SECTION OF PEDIATRICS—January 10

I. PAPERS OF THE EVENING—*a.* Local hypertrophy and atrophy of fat following insulin injections in juvenile diabetes, Alfred E. Fischer, Alfred W. Pollak; *b.* The influence of vitamin B supplement during infancy, Herbert L. Elias (by invitation), Reuben Turner (by invitation); *c.* The role of chronic vitamin C deficiency in the pathogenesis of experimental tuberculosis in the guinea pig, Meridian Greene (by invitation), Morris Steiner (by invitation), Benjamin Kramer; *d.* The relationship of the morphology of the diphtheria bacillus to its virulence, Lawrence W. Smith (by invitation); *e.* Electrocardiographic changes and peripheral nerve palsies in toxic diphtheria, Edward A. Burkhardt (by invitation), Cary Eggleston, Lawrence W. Smith (by invitation); *f.* Basal metabolism of tuberculous children, Anne Topper, Harold Rosenberg (by invitation).

SECTION OF MEDICINE—January 15

I. READING OF THE MINUTES.

II. PAPERS OF THE EVENING—*a.* Report of cases, William H. Dunn (by invitation); *b.* Psychiatric aspects of some physical diseases, Gerald R. Jameison; *c.* Physical aspects of some mental diseases, Gregory Zilboorg.

DISCUSSION—Opened by Dana W. Atchley, George Baehr, Joseph C. Roper.

SECTION OF GENITO-URINARY SURGERY—January 16

I. READING OF THE MINUTES.

II. PAPERS OF THE EVENING—*a.* Recent advances in biochemistry of practical interest to urologists, John A. Killian, Ph.D. (by invitation); *b.* Notes on kidney function, Herman O. Mosenthal; *c.* Review of the cardiac status of a patient to be subjected to genito-urinary surgery, Robert H. Halsey; Discussion by Edward L. Keyes, Clarence G. Bandler, Julius J. Valentine, George F. Hoch.

SECTION OF OTOLARYNGOLOGY—January 16

Joint Meeting with the College of Physicians of Philadelphia at the College in Philadelphia

I READING OF THE MINUTES

- II PAPERS OF THE EVENING—a The importance of the Schilling count as diagnostic and prognostic indicator in infections of the ear, nose and throat, Max Strumir, Discussed by Frederick Hemsath (by invitation), b The veins of the base of the skull and their relation to otolaryngology, Oscar V. Batson, Discussed by William Rogers, Columbia University (by invitation), c Defective surgical instruments as an avoidable cause of foreign body accidents, Chevalier Jackson, Discussed by Charles J. Imperatori

III GENERAL DISCUSSION

NOTE—There was a special car on the train from Pennsylvania Station leaving New York at 4 P.M. for members and guests of the Academy, and leaving Philadelphia at 10 1/2 P.M. The Section members were the guests of the Philadelphia group for dinner at the Rittenhouse Hotel

SECTION OF OPHTHALMOLOGY—January 21

- I INSTRUCTION HOUR, 7 to 8 o'clock—Slit lamp microscopy, a Cornea b Crystalline lens, Milton L. Berliner, Wendell L. Hughes

- II DEMONSTRATIONS, 7 30 to 8 30 o'clock—a Cases showing vascular fundus lesions, b Slit lamp studies, Milton L. Berliner, Isadore Goldstein, Wendell L. Hughes, Girolamo Bonaccolto, Gordon M. Bruce, c Display of the newer ophthalmoscopes Colonial Optical Company, d Display, Drawings of the ocular fundus, Gustave Bethke (by invitation)

- III SECTION MEETING, 8 30 to 10 30 o'clock—a Reading of the minutes b Report of a series of cases examined by the Ophthalmometer Wendell L. Hughes, c Demonstration of the method used at the checking station for tonometers of the Knapp Memorial Hospital, Adolph Posner (by invitation), d Paper of the evening, The ophthalmoscopic differential diagnosis between arterio and arteriolar sclerosis (with lantern slides), Jonas S. Friedenwald, Baltimore (by invitation), Discussion, Arthur J. Bedell, Walter I. Little, Philadelphia (by invitation)

SECTION OF OBSTETRICS AND GYNECOLOGY—January 22

Program Arranged by the Staff of the Margaret Hague Maternity Hospital, Jersey City

I READING OF THE MINUTES

- II PAPERS OF THE EVENING—a Spinal anesthesia in obstetrics, Samuel A. Cosgrove, Discussion to be opened by Jacob P. Greenhill Chicago (by invitation), b Report of a series of Latzko operations, James A. Norton (by invitation), Discussion to be opened by Henry T. Burns (by invitation), c Hospital management of bleeding in late pregnancy, Edward G. Waters (by invitation), Discussion to be opened by Robert A. MacKenzie, Asbury Park (by invitation)

AFFILIATED SOCIETIES

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with* THE NEW YORK ACADEMY OF MEDICINE
Anniversary Meeting—January 24

- I PRESENTATION OF CASE REPORTS—a Chronic nephritis, hypertrophy of parathyroid glands and osteitis fibrosa cystica, Earl P. Lasher (by invitation), b Two cases of ectopic chorio epithelioma, I. Gerber
- II PAPERS OF THE EVENING—a Pathology of Trypanosoma equiperdum infection in rats, David Perla, b Observations on certain pathological aspects of Schistosomiasis mansoni, Dominic A. DeSanto, c Chronic pulmonary arteritis in Schistosomiasis mansoni associated with right ventricular hypertrophy, Eugene Clark (by invitation)

NEW YORK ROENTGEN SOCIETY

The regular January meeting of this Society was not held. Instead a joint meeting of all roentgenologists from the Eastern States was held in Boston on Friday and Saturday, January 25 and 26, under the auspices of the New England Roentgen Ray Society.

SECTION OF ORTHOPEDIC SURGERY

Because of the meeting in New York City of the American Academy of Orthopedic Surgeons, January 14 to 18, the Section omitted its January meeting.

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE
under the auspices of THE NEW YORK ACADEMY OF MEDICINE—January 16

- I. Ultrafiltration of virus of vesicular stomatitis, J. H. Bauer, H. R. Cox.
 - II. Carcinomatous changes in virus-induced papillomas of the skin of the rabbit, P. Rous, J. W. Beard.
 - III. Early diagnosis of rabies by mouse inoculation. Immunity to rabies by mouse protection test, L. T. Webster, J. R. Dawson, Jr.
 - IV. Numerical relations of an unstable variant of *Salmonella aertrycke*, M. Deskowitz, A. Shapiro (Introduced by F. P. Gay).
 - V. Hemorrhagic changes in suprarenal cortex of adult rats following pituitarectomy, D. Perla.
 - VI. Vitamin C content of tissues of laboratory animals under various pathological conditions, E. Harde, H. R. Benjamin (Introduced by W. H. Park).
 - VII. Isolation of a specific ascorbic acid (Vitamin C) oxidase, H. Tauber, I. S. Kleiner.
 - VIII. Pulmonary blood velocity in states of congestive heart failure, with specific reference to velocity in the pulmonary venous circuit, H. R. Miller, M. Furman (Introduced by M. Ringer).
 - IX. Demonstration of hemorrhagins in snake venom by means of the chicken embryo, E. Witebsky, S. Peck, E. Neter (Introduced by Louis Gross).
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MEMBERS AND ASSOCIATES ELECTED
JANUARY 3, 1935

Members:

Meyer Golob	25 West 81 Street
Frederic David Zeman.....	111 East 88 Street
Maximilian Mark Nemser.....	57 East 88 Street
Arthur A. Knapp	133 East 58 Street
Philip Reichert	45 West 81 Street

Associate:

Harry Adolph Charipper.....	55 West 95 Street
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OBITUARY

THEOBALD SMITH 1859-1934

A master of his craft has departed. His intellectual heirs do well to examine the nature of his genius. Its usual characteristics were his; diligence, concentration, insight. But beyond them all, he cherished economy—economy of effort, economy of means, economy of expression. Elegance is the phrase which the competent in another science elect to use to describe his method. His ample vision saw what he saw concretely and its very concreteness made possible its succinct rendering. If he focused sharply on the core of his scientific interest, his friends knew nevertheless that his vision was directed through a wide angled lens. It was part of his culture and part of his tradition that caprice did not color his views; those who knew him best understood that no motive of personal fortune was permitted to obscure the scene about him in its social or its political significance. His taste, as little as any man's dictated the limits of his comprehension; he insisted upon the rectitude of his beliefs irrespective of their cost. A photograph, the last taken in his life, exhibits his salient qualities; pride without obtrusiveness, self-sufficiency without antagonism, learning without display, penetration without myopia, cultivation without egotism, kindness without sentimentality, exactitude without penury, reserve without unfriendliness. As a person he exhibited his inherited culture in an extraordinary degree, in his concentration, his austerity, his abounding hope. Characteristic of a follower of an old science in a new country, he was essentially a naturalist; he accepted the challenge of novelty in a novel scene. What more natural in consequence than that, trained in medicine, he should devote his talents to the study of problems arising in animal pathology. He did well in his choice—for himself and his characteristic mode of expression, never diffuse, and for his society which profited to an extraordinary degree by the success of his undertakings.



THEOBALD SMITH

1859-1934

A distinguished philosopher has said there is no first-rate problem confronting the modern world but the Greeks in their great period had discerned its being. Theobald Smith had the rare fortune of entering on his career when bacteriology was young. Of him it can be said, as of the Greeks, no major problem but he discerned its presence, though in the nature of things, in certain directions, his outlook could be no more than dim. Yet, quite consciously, he blazed new trails. Next to the discovery of bacteria themselves, his contributions to their meaning for ecology in general and for disease were as distinguished as any man's. A mere enumeration of the problems to which he devoted his attention exhibits the wide range of his understanding and of his interest. From the viewpoint of his own satisfaction he cultivated beside, another gift extraordinarily rare among empirical scientists, the ability which permits generalization. For he punctuated at frequent intervals, especially in his later life, the even run of his career by making systematic expositions of the course and the meaning of his science. These studies are contained in more than thirty of his publications. Those who are competent to judge found, there can be no doubt, his power of summary and his insight into significance, his crowning contribution to their own justification in the choice of their own researches. Approval by Theobald Smith, that he saw correctly and justly, has heartened more than one scientific wayfarer on his adventurous journey. To have both scientific gifts, the power to observe and the power to generalize, betokens the possession of a singularly distinguished endowment.

Doctor Smith's first publication appeared in 1883 and his last in 1934. He published single papers in 1883 and 1901. In every other of the 51 years the number was greater, sometimes reaching eleven (in 1897). He did not miss a single year. The total number is above 250. Here is evidence of his industry and devotion. Doctor Smith would have been the first to disclaim the importance of much publishing; quantity for him was never a substitute for care and deliberation. But that he published so uninterruptedly is evidence of another one of his profound con-

victions. He regarded himself, if one may use the phrase, throughout his career, a public servant, first in the Department of Animal Industry (1884 to 1895), then a Professor in Harvard University (1895 to 1914), and finally a Member of the Rockefeller Institute (1914 to 1934). On a public servant devolved, in his conception as in President Cleveland's, a public trust. This sort of responsibility was for him an ethical commonplace. The idea that the public was in his debt he would have regarded as inadmissible. It was an extraordinarily high sense of communal duty which sustained his seemingly frail person triumphantly, through his long years of uninterrupted labor.

An analysis of Doctor Smith's researches discloses other characteristics of his scientific method. His first paper devoted to the study of the tubercle bacillus was published in 1884, one year after receiving his medical degree, and in the second year after the publication of its discovery (1882) by Koch. Beginning in 1884, he published altogether 35 papers on this subject in 24 several years, the last one appearing in 1933. His first report on Texas cattle fever occurred in 1889; there were eight publications, the last in 1899. The first paper on contagious abortion appeared in 1893; there were 22 papers scattered through 14 years, the last in 1932. His interest in parasitism was awakened as early as 1887; to this problem he returned, for him perhaps the most important of all, embracing as it did the meaning of the relation of host and agent, in one form or another until 1932 toward the very end of his life. This list can be extended; but it is long enough to emphasize a point. Here is evidence enough drawn from many subjects to suggest something beyond a catalogue of interests—something beyond concern for passing or opportune occupation. An interest, clearly, was not adopted lightly, but once adopted remained an ever-present solicitude. Study as a profitable episode, as an occasion for opportunistic virtuosity, was it seems foreign to his nature.

But an estimate of Doctor Smith as a scientist which emphasizes merely his industry, merely his pertinacity, merely the wide range of his studies, neglects an appreciation of his essential genius. Industry, pertinacity, range, in themselves have been exhibited by lesser men. Because these qualities were coupled with other more enduring qualities it was possible for him to attain his distinguished stature. It was indeed the compelling, the naive curiosity of a naturalist, bringing to bear on natural phenomena his profound insight together with his sharp analytical abilities, that makes it possible to characterize his discoveries as illustrative of a high, perhaps of the highest, order of imaginative penetration.

There is opportunity for mention of a few only of his important investigations.

First of these were his researches into Texas cattle fever. By their means which constitute a model of method he brought to light a new and unknown mechanism. The mechanism which he discovered is now recognized to be widely exhibited in nature as an important means in the propagation of infectious diseases. In this mechanism, intermediate hosts, a tick in this case, perform the function of vectors of the agents of disease. This function of an intermediate host is applicable in malaria, in yellow fever, African sleeping sickness, typhus fever, trichinosis, tape-worm infections and no doubt in other diseases of men and animals.

Close observation convinced him of an essential difference among the tubercle bacilli which infect men and cattle. A controversy, in which Koch took an opposite position, continued until the correctness of his views came to be generally accepted. The point for which Doctor Smith contended has had further and wide extension at his and at the hands of others. As early as 1899 he spoke of "variation among pathogenic bacteria" and in 1900 of "adaptation of pathogenic bacteria to different species of animals." To these subjects and to the general problem of parasitism and

its bearing on the lives of lower invading and saprophytic forms, on infection and immunity, he returned again and again. Finally he resummarized his views in his Vanuxem Lectures, delivered at Princeton University in 1932-1933. It is not uninteresting that it was in this series (the Vanuxem) in which he developed more completely and more explicitly than elsewhere his conception of one of the most far-reaching problems that confronts biological scientists. That he was moved to give to his life-long reflections on this dominating theme the extended and searching form which these lectures exhibit may, one is tempted to suggest, have been due to their inclusion in a series in which they invited comparison with others offering a wide variety of subjects by scholars as well known and as distinguished as Morgan, More, De Wulf, Osborn, Whitehead. It is a source of lasting gratification that he embraced this opportunity in so masterly a fashion. Nor is it inappropriate in this connection, to observe the care which Doctor Smith took in the construction of his argument, in the choice of his prose so as to suit it exactly to his needs in maintaining his style free from the debased linguistic coin of the moment. If his form was brief, it was none the less elegant and in keeping with the elevation of his life and thought.

He possessed the prepared mind and put it to use on more than one occasion. The first description of a deficiency disease (scurvy), in an experimental animal was due to his possessing this quality. In studying erysipelas in swine, he found that on injecting bacteria derived from them into guinea pigs certain of them exhibited signs of an unfamiliar condition—and died. Death was due he thought to the absence of green food from their diet.

“The investigator,” to quote from a letter written by Doctor Smith to Doctor Krumbhaar (October 11, 1933) “must be ready and on the spot when the light comes from whatever direction.” Alfred F. Hess*, ever a careful wit-

* Scurvy, Past and Present. J. B. Lippincott Co., Philadelphia and London, 1920.

ness, records the fact that "There is no mention whatsoever of scurvy in animals previous to 1895 when Theobald Smith made these observations." Doctor Smith's words deserve full quotation as illustrative of his method of investigation.

"No. 254 died December 14, twenty-nine days after inoculation, after having shown signs of illness for a few days. There was no local lesion. On both hind limbs subcutaneous and deep patches of hemorrhagic discoloration. One small patch on mucosa of stomach. Caecum hyperemic. On mucosa scattering ecchymoses and small yellow necrotic spots. The ileocecal valve encircled by a necrotic line. Cultures were made with bits of spleen, liver, and loops of blood. All but the liver tube remained sterile. In this (agar) a few colonies, not of the injected bacilli appeared.

To explain the death of this guinea pig it will be necessary to record some facts which have been observed for some years in this laboratory. When guinea pigs are fed with cereals (bran and oats mixed), without any grass, clover, or succulent vegetables, such as cabbage, a peculiar disease, chiefly recognizable by subcutaneous extravasation of blood, carries them off in from four to eight weeks. The death of No. 254 was undoubtedly due to the absence of such food, as the attendant had neglected to provide it after the disappearance of grass in the fall of the year. Furthermore, No. 255 was weakened by the restricted diet and succumbed to an inoculation which otherwise might have had no visible effect. This is clearly demonstrated by the following test experiment:

December 29, 1894. Two guinea pigs (Nos. 298, 299) received into the abdomen 0.25 and 0.4 c.c., respectively, of a bouillon culture of this bacillus.

At the same time, two others (Nos. 307, 308) received into the abdomen 0.25 and 0.65 c.c.† of the same culture. These two and a control guinea pig were put into the same cage and fed only oats and bran mixed, while the two first mentioned received daily rations of cabbage in addition.

The outcome of the experiment demonstrates the fatal result following the abstraction of green food. While those fed with cabbage survived, those not fed with it died."‡

The last paragraph of the quotation makes evident that he understood very well that these observations constituted a discovery and indicates clearly its nature. He went no

† "Owing to a slipping of the guard on the piston rod this larger dose was injected unintentionally."

‡ Twelfth and Thirteenth Annual Reports of the Bureau of Animal Industry, 1895-1896, p. 172. Government Printing Office, Washington, 1897.

further with this research; the time was not ripe though he does not hesitate to attribute the events to "abstraction of green food." Ten additional years were required to pass before vitamins and deficiency diseases began to be understood.

Three others of his discoveries require brief mention. First he showed that immunity to infection may be established if individuals likely to be exposed are first treated by injection with killed cultures of appropriate micro-organisms. The principle which was deduced from these experiments is embodied in the current widespread practice of vaccination against typhoid and para-typhoid fevers and cholera.

Second, the phenomenon widely known as anaphylaxis or anaphylactic shock in guinea pigs was observed first in 1904 by Doctor Smith and was in fact known for some time, especially abroad, as the "Theobald Smith phenomenon" so called by Otto. Doctor Smith had spoken to Paul Ehrlich of this observation. The close relation of hay fever, of certain types of asthma and serum sickness, to the mechanism of hypersensitivity, is now common knowledge.

Third, his researches on a disease of turkeys, called Blackhead, are not sufficiently well known but deserve a place beside those on Texas cattle fever, for they also explore a new principle in infectivity. The underlying conceptions were derived in fact from ideas concerning parasitism. The disease originates in the interplay of activity of a nematode worm and a protozoan parasite. How frequently the principle of interdependent invasion by two organisms exists is not yet known. But an understanding of this form of infection has already had very important and beneficial results in the industry of raising turkeys. Turkey farming has become a profitable enterprise.

Doctor Smith's other contributions to bacteriological technique, immunological practice and administrative reforms in the public health were numerous. They were

the by-products of a busy life. Actually, due to his sense of public responsibility, they must be reckoned as important. They would have constituted contributions more than respectable in the case of other men.

From this rapid analysis of his motives and of his researches, no one will be disappointed to learn that no bacteria have been named for him, nor have methods. His influence has been deeper and more profound. The significance of his reflections has had wider consequence. He grew with the growth of his science and impressed his conceptions upon it at many points. He cared less, it seems, for the details without which there can of course be no science, than for the wide basic principles which he did so much to aid in developing. For him diseases became problems in parasitism; bacteria, the occasion for the study of biological principles—fixity, mutation, variation.

The time obviously has not come, even if it were profitable to do so, to assign to him his place in the hierarchy of men of science. But if a contemporary exercising the perspective permitted to one not connected with his interests may venture an estimate, it is that those whose admiration he has won because of his many distinguished virtues, will place his name among the very greatest of his discipline.

A. E. C.

THE COUNCIL OF THE ACADEMY ON JANUARY 23, 1935,
PASSED THE FOLLOWING RESOLUTION:

RESOLVED, that

The Council of The New York Academy of Medicine records its appreciation of the life work of its distinguished Honorary Fellow, the late Dr. Theobald Smith, who died on December 10, 1934. Dr. Smith was distinctly a product of American education. He followed his bachelor degree in philosophy to his doctorate in medicine, and devoted his entire career to the study of the pathology, etiology and cure of disease in their interrelations with the illnesses

of man and animals. He possessed a remarkable imagination and intuition for scientific medical research in those chosen fields. His discoveries were of new and primary importance in many directions, and though often they were at first criticised and rejected by his elders and contemporaries, Dr. Smith lived to see his work universally endorsed and accepted, and died the recipient of many honors and degrees from the universities and scientific societies of America and Europe.

The Council extends its sympathy in their sorrow to his family and to the institutions in which he was still actively at work as counselor and executive.

The Council records further the participation of the Academy in the universal feeling of loss which has been spread through all the scientific communities of the civilized world by the death of Theobald Smith.

DEATH OF FELLOW OF THE ACADEMY

DENNELL, ROGER HERBERT, M.D., 842 Park Avenue, New York City; graduated in medicine from Harvard Medical School in 1902; elected a Fellow of the Academy December 3, 1908; died February 3, 1935. Dr. Dennett was a Fellow of the American Medical Association, a member of the County and State Medical Societies, Director of Pediatrics at the Post-Graduate Hospital and Professor of Clinical Pediatrics at the Post-Graduate Medical School. He was Consulting Pediatrician to the Willard Parker, Passaic General, Hackensack, West Side, Broad Street, and Mather Memorial Hospitals.



BULLETIN OF
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No. 3

Editorial

FELICE FONTANA:

A FORGOTTEN PHYSIOLOGIST OF THE TRENTINO

Of old, an *abbot*, *abbé* or *abbate* was primarily an ecclesiastic, who presided over an abbey or other community of monks or was treasurer of its revenues. But even before the Council of Trent, there were lay, as well as clerical abbots, who discharged no spiritual functions, even while subsisting on the revenues of abbeys. Eventually the term was loosely applied to lay clergyman of the type of La Fontaine or Galiani or Liszt, who wore "the dress of a secular ecclesiastic." Some of these men have played no inconsiderable part in the history of science or of medicine. One thinks offhand of Nollet, Quillet, Spallanzani, the *abbé* de l'Epée and his successor Sicard, or the great name of Mendel. Prominent in the lay group stands the name of the *abbate* Felice Fontana (1720-1805), pioneer in the investigation of serpent venoms, whose life-span covered the greater part of the 18th Century; who was alive when Marengo was fought, Fort Dearborn built and the Eroica Symphony played; who lived to see Napoleon made Emperor of the French and died a few months before the battle of Trafalgar. Born at Pomarole, near Rovereto (Austrian Tyrol), on April 15, 1720, Fontana gained his education at Verona, Parma, Padua and Bologna, and early occupied the chair of philosophy at Pisa. Eventually he was called by the Grand Duke of Tuscany (later Leopold II) to take charge of the Museum of Physics and Natural History at Florence, founded by the Accademia del Cimento, and repository of the apparatus used by Galileo, Torricelli

and Viviani in their epoch-making experiments. To this Museum, after some years of travel, spent in collecting specimens in France and England, Fontana devoted the last thirty years of his life. Outstanding in this unrivalled collection was his great assembly of anatomical preparations in colored wax, of which he was the special creator. No less than eight separate Italian biographies of Fontana have been written and published in recent years.¹ As an experimental physiologist, he has come into his own but latterly. During his lifetime, Italy, like Germany, existed as a loose congeries of petty principalities, dominated mainly by Austria and Spain, and devoid of any realistic aspiration toward nationhood, beyond a vague feeling for the past glories of Roman power. Mental independence and spontaneity were submerged by a rigid, schematic system of scholastic dogma and all sense of national character was lost. Nevertheless, for Italy, as for the rest of Europe, the 18th Century was a "germinal century," matrix *in posse* of all the going ideas of the modern world, even the egalitarian principles of the French Revolution, in which Fontana became involved, to his cost, toward the end of his life.

Recent interest in Fontana centres on his work in physiology, which has been considerably overshadowed by the spectacular interest attaching to his Museum of wax preparations. He began as a promoter of the ideas of Haller (*fautor Halleri*), in particular of the Hallerian doctrine of irritability.² In his book on the anatomy of the liver (1654), Glisson had stated that vital phenomena depend upon the ability of all living things to react to stimuli; in other words, upon the tendency of living tissues to react to irritation. This property of irritability is expanded at length in Glisson's posthumous treatise on the stomach and the intestines (1662-77). In Haller's hands, irritability became merged into muscular contractility while the conductibility of nerve was differentiated as "sensibility." Zimmerman had found that application of laudanum will arrest the pulsations of an isolated heart without destroying the irritability of the cardiac muscle (1751). Fontana found that opium will inhibit intestinal but not cardiac

irritability (1757). He denied the irritability of nerve, since no irritation of cardiac nerves will inhibit the motions of the heart; and reasoned that the dura mater, the tendons, veins, arteries, membranes and placenta are alike insensible to laceration or the action of caustics. Alcohol applied to the brain, the medulla or the crural nerves will inhibit the action of the corresponding muscles, where a watery solution of opium is inert; whence the effect of laudanum is ambiguous. Experiments upon 300 frogs showed the effect of opium upon an exposed nerve to be *nil*. The main interest of these findings is their effect upon such phases of 18th Century doctrine as the tonic-atomic hypothesis of Hoffmann, the sthenic and asthenic pathology of Brown or the stimulus and contrastimulus of Rasori. Fontana's researches of 1775³ reveal the loyal standard-bearer of Hallerian doctrine as to the autonomy of the heart: that its rhythmic contractions are consequent upon inherent muscular "irritability," and independent of nerve-supply. In our own time, Ehrlich defined irritability as "the most obscure phase of physiology." In his monograph on the movements of the iris (1767)⁴, Fontana confirms Haller and Caldani in associating the pupillary reflex with the reactions of the retina to light. At the same time, he noted the effect of cerebral excitement upon the dilatation of the pupil, thus anticipating the "psychic pupillary reflex," of Gratiolet (1855). In 1778, he discovered Fontana's space and the ciliary (Fontana's) canal⁵.

A pioneer in histology, Fontana studied the effects of acids, alkalies and colored solutions upon the irritability of tissues and red blood corpuscles. With such microscopes as he had, he appears to have noted the cell nucleus in the epidermis of the eel; the pus cells and the compressibility and elasticity of red blood corpuscles (Bilancioni). He teased out the fasciae and the cylindric fibrils in muscle preparations and noted the transverse striae. Cirincione points out that Fontana described the axis cylinder of nerve (*cilindro primitivo nervoso*) before Remak and the nerve sheath before Schwann (1779).⁶ The same observant spirit is apparent in his studies on the structure of the

brain, and on the effects of compression of the nerves. While visiting the Hunterian Museum in London (1779), Fontana made microscopic observations on the regeneration of nerve, simultaneously with Cruikshank.⁷ In 1783, he described hydatid disease of the brain in sheep and man.⁸ From the clinical effects of this malady, he takes the extremist view that nervous and mental diseases are attributable to lesions in the nervous system and not to psychic disturbances.

Fontana's pioneer experiments on serpent venoms (1767-81)⁹ are classical in the history of toxicology and pharmacology. Employing the common European viper (*Vipera berus*), he found that it is immune to its own venom; that the venom is ejected and injected by the canalized teeth; is of a gummy consistency, neither acid nor alkaline, or as Lucien Bonaparte saw later, an albuminoid; and that, in the serpent itself, it is not so much an offensive weapon as a digestive juice (Calmette). Its fatal effects he attributes not to clumping or dissolution of red blood cells, but to muscular atony and paralysis. Fontana made innumerable experiments with the venom, not only upon animals, but also upon himself, even to the extent of swallowing the poison. In all this, he was the venerated precursor of Weir Mitchell, Reichert, Noguchi, Fraser, Kyes and Calmette. He extended his researches to the effects of animal and vegetable poisons, notably curare and *Laurus cerasi*. In like manner, Fontana was forward and prominent in those investigations of "dephlogisticated air," "fixed air" and other gases discovered by Cavendish, Scheele, Priestley and Black, which remained meaningless up to the luminous synthesis of Levoisier. Fontana's discovery that carbon will absorb gases (1777) was confirmed by Priestley himself (1779). In the matter of physical experimentation, Fontana was a facile inventor of instruments. Among these was an apparatus for the inhalation of oxygen in phthisis (Bilancioni). As a botanist, he was equally active and made his mark in vegetable pathology by his investigations on the rust of grain (1767) and spurious ergot (1775).

Like all the greater physicians of the 18th Century, Fontana was thus one of the most versatile biologists of his period. Yet, the variegated mass of his experimental work has been almost completely overshadowed by his extraordinary museum of wax preparations at Florence. The medical collection of this exhibit originally comprised some 3000 specimens and 24 life-sized statues, viz., 4 each of the muscular lymphatic systems, 8 of the circulatory system, 5 of the nervous system, one each of the ligaments and chyliferous system and one gravida. The viscera comprised 650 separate pieces; the brain 55 and the nervous system, the finest of all, over 500 pieces, apart from the man-sized *écorchés*. In addition, there were representations of all phases of labor and obstetrics, of surgical operations, of mushrooms and plants. Fontana was not only the inventor of colored anatomic illustration in wax, but through the cooperation of his assistant Manzolini, probably the greatest artist in this medium in his period. His anatomic preparations were executed as a sort of composite figurature from many dissections, in keeping with the "anatomic norm" of Albinus. The photographic reproductions from the Montpellier collections, published by Bilancioni;¹⁰ are not only accurate in detail but also beautiful in execution. So impressed was Joseph II with the Florentine collection that he ordered Fontana to reproduce it in entirety for the Josephinum in Vienna. Upon the death of this kindly and kingly patron, Fontana's troubles began. Leopold II, a colder and narrower man, did not hold the anatomist in esteem. A gigantic *écorché*, which Fontana had begun, proved a fiasco, through cracks in the wooden framework, not remediable by varnish. He became involved in religious and political tangles of a distressing character. When the French entered Italy he espoused the cause of the Republic, was subsequently arrested and imprisoned by the Austrian authorities and, upon his rescue by the Napoleonic forces, was required to duplicate his wax collections in France. Thirty-three specimens in the Anatomic Museum at Montpellier are all that survive of this episode. In his sympathies with the French Revolution and Republic, Fontana was obvi-

ously a stifled precursor of the *Risorgimento*. In this terminal episode, he had discovered that patriotism, so often "the last refuge of a scoundrel," yet "thrives upon the blood and tears of those whose hearts it has broken." As he advanced in years, he adopted an indifferentist philosophy, allied to the Stoic *ataraxia*, concerned himself not at all about foreign adulation and so lived more at ease with his captious fellow townsmen. He died on March 9, 1805, at the age of 85, and was buried with great pomp in the Florentine Pantheon, Santa Croce, where repose the remains of so many illustrious dead.

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THE PROBLEM OF ACUTE APPENDICITIS IN NEW YORK CITY*

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INTRODUCTION

Vast quantities of words have been written and spoken about acute appendicitis. We have had it paraded before us in medical literature and discussed repeatedly at medical meetings. It has become such a common part of our professional diet that we have lost our taste for it. We shrug our shoulders and accept it as an inevitable evil. We wonder what more can possibly be said about it, and we go to medical meetings with a feeling of resentment and boredom that we are asked to listen to just another paper on appendicitis. But when we hear that the operative mortality of acute appendicitis in fourteen representative New York hospitals was 7 per cent in 1921 and only one-tenth of one per cent less in 1931, we may agree that the time has not yet come to dismiss the subject. On the contrary, it is ripe for a united and constructive effort on the part of the medical profession of New York toward correcting this condition.

Some time before his death, Dr. Linsly Williams, Director of The New York Academy of Medicine, suggested that a survey on acute appendicitis, similar to those that have been conducted in other cities, should be undertaken. It is with deference to his wishes and respect to his memory that I offer you this survey.

* Presented before a Stated Meeting of The New York Academy of Medicine, November 8, 1934.

**GENERAL CONSIDERATION OF THE INCIDENCE AND
MORTALITY OF APPENDICITIS**

In 1927 Dr. J. V. De Porte, Director of the Division of Vital Statistics in the New York State Department of Health, undertook a "Sickness Survey" of rural New York. His findings are based on weekly reports received over a period of one year from 107 physicians in 33 counties serving a total population of about 100,000. Each physician agreed to report only new cases as they were seen for the first time. No subsequent visits were reported. It is an interesting side-light on the rural incidence of certain diseases:

Measles	1201
Bright's Disease	1134
Appendicitis	966
Gonorrhea and Syphilis	908
Chicken-pox and Whooping-cough.....	882
Scarlet Fever and Pneumonia.....	566
Diabetes	505
Cancer (all forms)	464

The report does not state how many of these cases of appendicitis were of the chronic type, or how many came to operation. But at least it shows that the diagnosis is made with astonishing frequency, and is a fair indication of the prevalence of appendicitis.

The concentrated attention of the medical profession, the Department of Health, and the laity in New York City has been directed for many years against the contagious diseases. The result has been a very marked reduction in the number of deaths from these causes. The Health Department figures show that in 1920 there were 2,876 deaths from the following six contagious diseases: measles, whooping-cough, scarlet fever, diphtheria, typhoid fever, and epidemic meningitis. In 1933 there were 629 deaths from these same diseases. This represents a reduction of 78 per cent. The number of deaths from appendicitis, how-

ever, has shown a gradual rise during the same period from 792 to 1,149, an increase of 45 per cent. (See Chart I.)

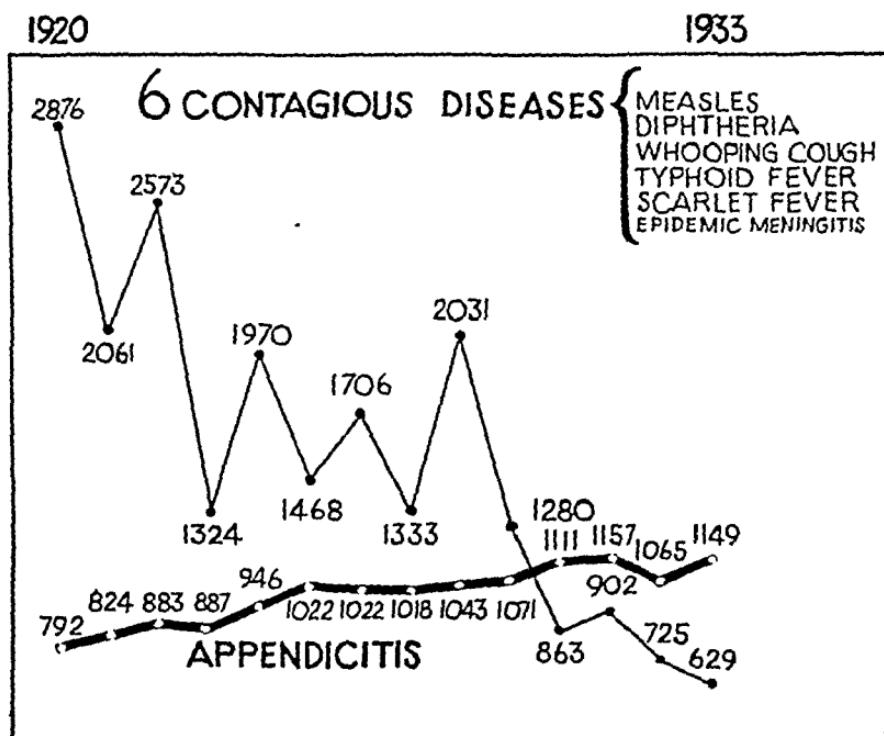


CHART I.—Numbers of deaths in Greater New York City from six contagious diseases, and from appendicitis, 1920-33.

In 1930, 1931, and 1932—(the period covered by the Maternal Mortality Survey conducted by The New York Academy of Medicine) there were 2,041 deaths from puerperal causes registered with the New York City Department of Health. In the same period there were 3,333 deaths from appendicitis.

The reduction in the mortality (deaths per 100,000 of population) of diphtheria and tuberculosis is compared with the rise in the mortality of appendicitis. (See Chart II.) Diphtheria and tuberculosis have been the objects of a well-organized attack on the part of the medical profession, health officials, and the laity; appendicitis has not. These figures are taken from the actual death certificates, which implies an accuracy of diagnosis which is not with-

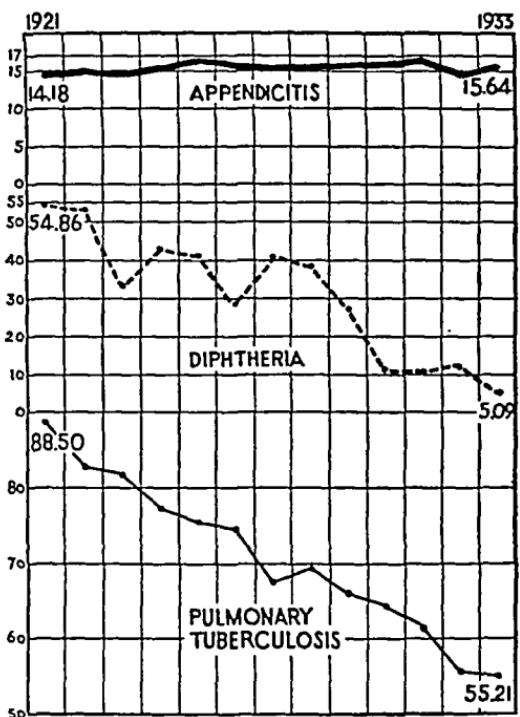


CHART II.—Comparative mortality per 100,000 population of appendicitis, diphtheria, and pulmonary tuberculosis in New York City from 1921 to 1933. The New York City Health Department bases its rate of diphtheria on the number of deaths per 100,000 under 15 years of age.

out a factor of human error. However, the general trend is obvious, and lacking any other better method of obtaining this information, they must do for the present. The fact remains that appendicitis is a common condition and its mortality in New York City is too high.

THE SURVEY

The rest of this paper will be devoted to an analysis of 4,542 cases of acute appendicitis, prepared from a personal study of each individual chart in the record rooms of fourteen hospitals in Manhattan. An attempt has been made to draw a ten-year comparison between the years 1921 and 1931. In a few instances hospital records were not available for 1921, so the nearest subsequent year was taken in order to carry out the comparison. Unfortunately there has not

been time to bring this record up through 1933, as the work was started in 1932 and only recently finished. I wish to thank the directors of surgery, the superintendents and the record room employees of these hospitals for their cordial reception, and to say that in no instance was any diplomatic difficulty encountered. The following hospitals cooperated in this work: Bellevue, Beekman Street, Broad Street, French, Harlem, Lenox Hill, Mt. Sinai, New York, Polyclinic, Post-Graduate, Presbyterian, Roosevelt, St. Luke's and St. Vincent's. This is obviously a representative list of the Grade A hospitals, and the result in these hospitals might fairly be expected to be somewhat above the average for the whole city.

Only those cases of acute appendicitis in which the diagnosis was certain beyond any reasonable doubt have been included. Many cases were rejected in which the operative description or pathological findings were unconvincing. No cases of so-called chronic, or sub-acute appendicitis were included, nor were any of those which were operated on during the interval between attacks. In 1921, 2,208 cases were operated upon in these 14 hospitals. In 1931, 2,334. In some of the following statistical charts the two years have been combined because the figures of either year were of no particular significance from a comparative standpoint.

AGE INCIDENCE AND AGE MORTALITY

There was a variation of less than 1 per cent throughout in the age incidence in the two years, and therefore they are charted as one. In 29 cases the age was not recorded on the

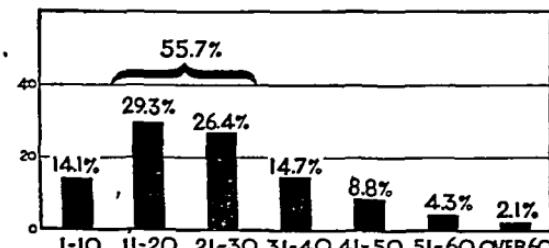


CHART III.—Age incidence of acute appendicitis in 14 New York hospitals for 1921 and 1931 combined.

charts. There is nothing particularly interesting here except further evidence that acute appendicitis is primarily a condition of youth and young adult life, nearly 56 per cent of all cases occurring in the second and third decades. (See Chart III.)

The comparative mortality according to age, on the other hand, is of some interest, because it shows in 1931 a marked increase over 1921 in the older age groups. This might be accounted for on the basis that people over 50 have been unable to throw off the ill effects of unemployment and economic stress as well as the younger groups have, and have suffered an attack of appendicitis in a condition of comparatively greater lowered resistance. (See Chart IV.)

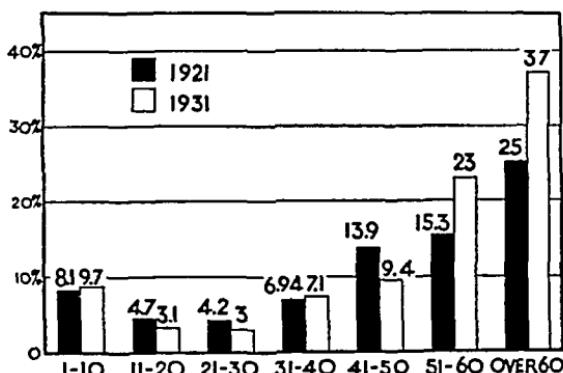


CHART IV.—Comparative mortality as to age in 1921 and 1931.

SEX INCIDENCE AND SEX MORTALITY

The incidence according to sex checks pretty well with other authors—68 per cent males—34 per cent females. The mortality according to sex is a different story. The Health Department figures for the City in 1921 show 495 deaths among men and 329 among women, and in 1931, 682 among men and 475 among women. In the rest of the State the same relative picture holds true. This chart gives us a good picture of the increase in the number of deaths in both sexes during the 10-year period in both City and State. The actual mortality among men was slightly higher than that among women (7.2 per cent and 6.8 per cent in the hospitals studied). (See Chart V.)



CHART V.—Numbers of deaths from all forms of appendicitis as based on figures supplied by the Health Departments of the City and State of New York.

SEASONAL VARIATION

The question of seasonal variation has been discussed by others. This chart is based on only 2,672 cases. It is difficult to explain the marked rise during the month of March. Most of us, however, have probably observed in our hospital work the later rise that occurs during the summer months. The curve seems to follow somewhat the curve of exacerbation of peptic ulcer. There are some who might offer it as evidence in favor of the bacterial theory of the etiology of ulcer. At least we are all familiar with the apparent clinical association that exists between symptoms of peptic ulcer and a pathological appendix. Seasonal variation is a matter which would bear further study. (See Chart VI.)

PREVIOUS ATTACKS

The question of previous similar attacks was studied with the hope that it might cast some light on the attitude of mind of the public. If it could be demonstrated that in 1931 more patients sought admission in hospitals during their first attack of abdominal pain than was the case in

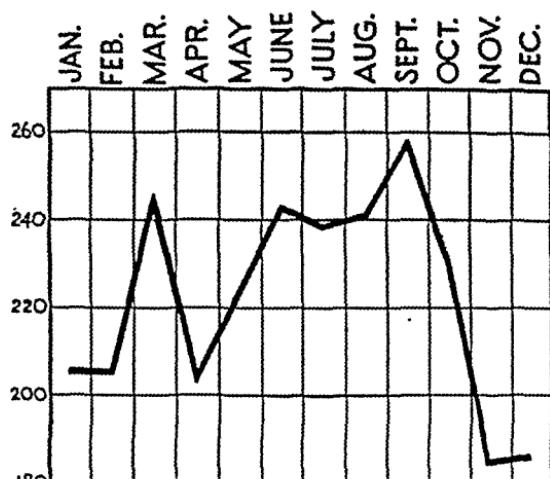


CHART VI.—Seasonal variation of acute appendicitis in 2672 cases.

1921, it might be favorably construed as a step forward. Here we are confronted with a discouraging surprise. In 1921, 40 per cent of the hospital charts contained no information about previous attacks, and in 1931 nearly 45 per cent.

Discarding all charts that contained no information, we find that in 1931 fewer patients were admitted during their first attacks than in 1921—46.4 per cent as against 48.7 per cent. This can hardly be construed as evidence that the public has become more “appendix minded.”

CATHARTICS

I hesitate to present any figures on cathartics because of a woeful lack of information. In 1921, 69 per cent of the hospital charts were completely lacking in any mention of catharsis, and in 1931, 63 per cent. Again in 1921 such information as was given was incomplete in 20 per cent of the charts, and in 1931, 16 per cent. We are, therefore, reduced to such a small number of cases in which this information was complete—230 in 1921 and 468 in 1931—that any conclusions would be of little value. No attempt was made to compare the mortality in the “cathartic patients” with that in the “non-cathartic” group because of this incomplete information. Nor was it possible to answer many

other important questions in this category, such as: Where lay the responsibility for prescribing cathartics? What kinds predominated? What was the effect on the symptoms, and what apparent relation did catharsis bear to the pathology found at operation and the subsequent course of the illness?

There are some who still feel that too much emphasis has been laid on the whole question of catharsis. The anti-cathartic campaign that has been waged in Philadelphia is now familiar to all. Several years ago the County Medical Society there sent out 300,000 stickers to 3,813 physicians to be attached to their monthly bills. The sticker read:

"Warning—In the presence of abdominal pain never give a laxative. Give nothing by mouth. Apply ice-cap or hot water-bottle. Call your family physician. Abdominal pain which lasts over six hours is usually serious. This warning is published by the Philadelphia County Medical Society and endorsed by the Department of Public Health."

Further propaganda was launched through the press, radio, retail drug stores, and in the class-rooms of the public schools. Bower believes that the creditable reduction in the mortality of acute appendicitis in Philadelphia has been due in some measure to this anti-cathartic campaign. Those of us who are still skeptical should accept his views and those of many others—until someone has conclusively proven that the administration of cathartics in acute appendicitis is beneficial.

TIME ELEMENT

The importance of the time element in acute appendicitis is axiomatic. (See Chart VII.)

Here we find evidence that the constantly repeated warnings about the dangers of delay have borne fruit. In 1931 there is a very notable increase in the number of patients who were admitted to these hospitals during the first 24 hours of their illness. There is also a corresponding fall in

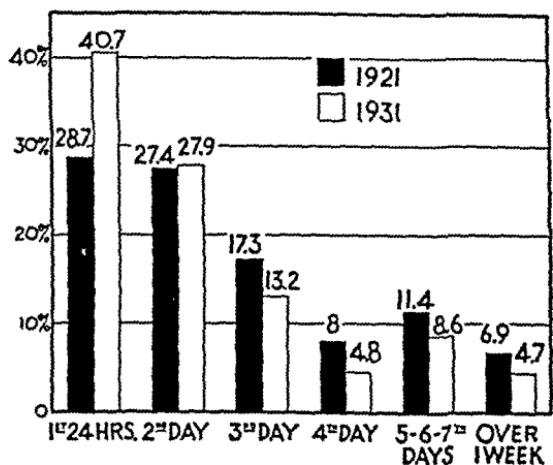


CHART VII.—Percentage of admissions based on time elapsed between onset of symptoms and admission.

the late arrivals. The 5th, 6th and 7th days have been grouped together arbitrarily, hence the apparent rise here. If they were divided into their 3 components, this rise would not appear.

In considering the time element, the factor of operative delay is obviously important. This is unavoidable in many instances. Patients who are admitted toward the end of the first 24 hours quite naturally are carried over into the second 24 hours before operation can actually take place and this holds through all the time groups. (See Chart VIII.)

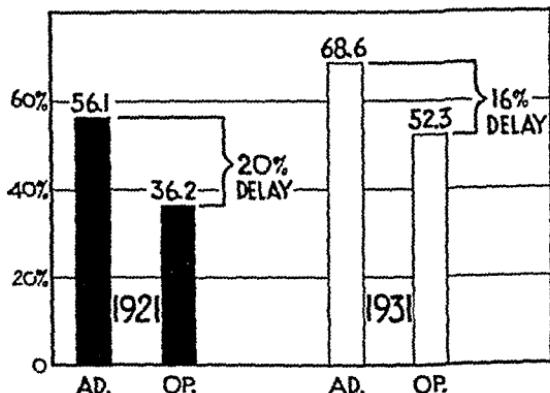


CHART VIII.—Theoretical factor of operative delay. Admissions and operations during first 48 hours of illness.

Chart VIII is based on admissions and operations during the first 48 hours of illness. We find that in 1921, 56.1 per cent of all patients were admitted during the first 48 hours, but only 36.2 per cent were operated upon during that period. This gives a theoretical factor of delay of 20 per cent. In 1931 this factor was reduced to 16 per cent. This same relative reduction in operative delay was found throughout the other time groups.

In spite of the fact that in 1931 many more patients were admitted during the first 24 hours of their illness, and in spite of the reduction in operative delay, we find that the mortality rate for each time group is actually higher than it was in 1921, with one exception—the first 24 hours. (See Chart IX.)

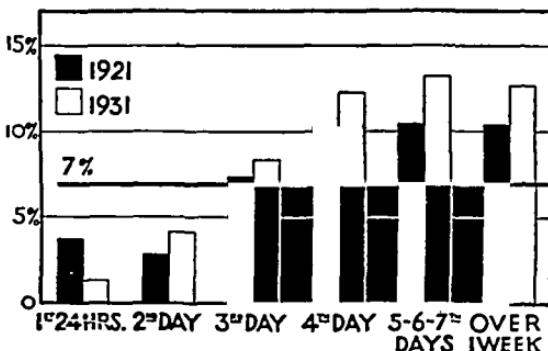


CHART IX.—Mortality in various time groups based on time elapsed between onset and operation.

The explanation does not lie in the time element alone. It must be sought elsewhere—possibly in the surgical management of the late cases. For although the mortality in the early stages may soon reach a theoretical irreducible minimum, it is to the treatment of the complications that arise in the later time groups that our attention should be directed—until the millennium when no patients will have to be operated upon after 48 hours.

PATHOLOGY

A study of the individual pathology in each case is of the greatest importance. Here we find the true explanation for the undiminished death rate in acute appendicitis. If it

were possible to have complete information and to devote more time to a painstaking study, we would also find here the true evidence of the skill and judgment of the individual surgeon. The removal of an early acute appendix is ordinarily a fairly simple procedure. But there is not a single surgeon here tonight who has not had his technical ability, patience and judgment taxed to their limits by the difficult appendix that is complicated by an abscess or peritonitis. It is only through these trying and bitter experiences that we learn to develop a humble and wholesome respect for this small but dynamic organ.

In studying the individual charts from the pathological angle the difficulty of interpreting the operative findings of others was impressive. But an honest effort has been made to do this with an open mind, and to classify each case as fairly and accurately as possible. I admit a considerable factor of human error, but at least it is a constant one, due entirely to the interpretations of a single individual.

I have followed the pathological classification in use at the Presbyterian and a few other hospitals. There are 5 groups: 1. Acute appendicitis (uncomplicated); 2. Acute appendicitis with acute local peritonitis; 3. Acute appendicitis with peritoneal abscess; 4. Acute appendicitis with acute diffuse peritonitis; 5. Acute appendicitis with progressive fibrino-purulent peritonitis. (See Chart X.)

1. *Acute Appendicitis (Uncomplicated)*. The first group is simple and clear cut. The pathological picture may vary from the appendix which shows injection of the serosal surface, edema of its coats, invasion by polymorphonuclear leukocytes, and erosion of the mucosa, to one of advanced gangrene. But only if the process has remained entirely limited to the appendix has the case been classified in this group. The presence of clear peritoneal fluid has not been interpreted per se as peritonitis. As might be expected, the great majority falls into this group.

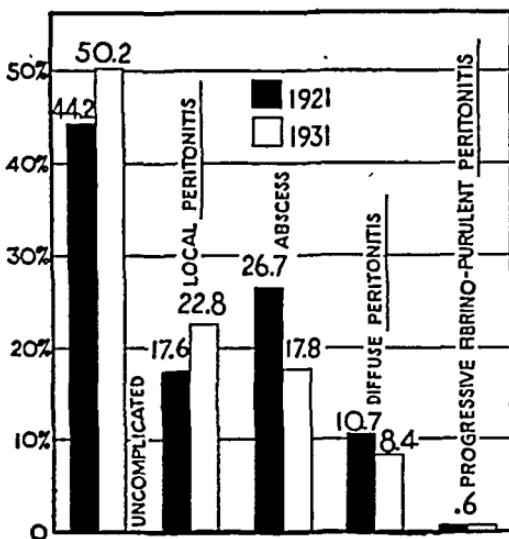


CHART X.—Incidence of pathological types.

2. Acute Appendicitis with Acute Localized Peritonitis.

Here the pathological process has escaped beyond the confines of the appendix itself. We find the deposition of plaques of fibrin about the appendix, cecum, and possibly neighboring intestinal loops. The omentum will probably be involved in the inflammatory process in its ever watchful role of guardian of the peritoneal cavity. The wall of the cecum and nearest loops of small intestine will be injected and somewhat dilated, and there may be some clear or turbid or even frankly purulent fluid in the vicinity.

3. Acute Appendicitis with Peritoneal Abscess.

This classification is simple if we merely bear in mind just what an abscess is. Here there will be a circumscribed collection of pus, usually of foul odor, maybe a few drops or maybe many ounces. It will be completely walled off from the rest of the peritoneal cavity. The appendix will probably be found in the abscess cavity or one of its walls. These walls will be composed of different structures depending on the location of the abscess. They are the result of a local peritonitis. They are the brick and mortar produced by the peritoneum and omentum.

4. *Acute Appendicitis with Acute Diffuse Peritonitis.* In attempting to allocate cases to this 4th group I have tried to bear in mind constantly the definition made by Dr. Joseph Blake in 1903, and recently revived by Potter: "By diffuse peritonitis I mean an established progressive inflammation without definite limitations, evidenced by extensive redness of the peritoneum, a definite inflammatory exudate, a tendency to general involvement and intestinal paralysis."

There are some who prefer the term "spreading peritonitis." Is not the whole process of acute appendicitis from its onset a constantly spreading and advancing one? But what determines the prognosis of the patient, the immediate procedure and after-care? It is the extent to which this process has spread. There are many cases of an acute inflammation of the appendix that will progress to a local peritonitis. There are many cases of local peritonitis that are still spreading and will advance to a diffuse process unless arrested by the removal of the appendix and by the natural tissue defenses. There are many cases of localized abscess which would have advanced through the stages of a spreading peritonitis to a diffuse peritonitis if they had not been arrested by these defenses. The term "spreading peritonitis"—except for reminding us of the fundamental characteristic of appendicitis—has caused some confusion in the accurate classification of the disease in its various phases.

One of the most striking facts of this whole study has been the too great frequency with which many surgeons have classified cases as diffuse peritonitis in the presence of very insufficient evidence. It is a difficult diagnosis to establish especially through a McBurney incision. But it can be done with reasonable accuracy if a careful and sincere effort is made. It is obvious that the greater number of cases that are dubiously classified as diffuse peritonitis, the lower will be the mortality in this group. I cannot help but feel that if greater care and accuracy were observed at the

time of operation, we would find that many cases would not be classified as diffuse peritonitis, and the mortality in this group would be even higher than its present startling rate.

5. Acute Appendicitis with Progressive Fibrino-Purulent Peritonitis. The last pathological group is one that is not often found in the operating room, but more often at autopsy. Here there are multiple abscesses scattered among the coils of the intestine, a massive production of fibrin with loops of intestine fused together in friable masses, frequently causing angulations and mechanical obstructions—always causing a complete paralysis and tremendous distention of the intestinal tract. Whether this is a pathological entity, whether it is the inevitable end result of all unarrested cases of diffuse peritonitis, whether it is due to a certain type of micro-organism or to a variation in the defensive mechanism of the individual, is not clearly understood. Fortunately it is a fairly rare condition. If recovery takes place it is nearly always after multiple operations for the drainage of abscesses and will probably be followed by chronic intestinal obstruction due to adhesions and invalidism of varying degree.

You will notice a rise in the first two pathological groups, and a fall in the abscess and diffuse peritonitis groups. This can be accounted for in large measure on the basis of the time element. It is logical to suppose that, with more patients being operated upon in the earlier time periods, we should find a higher percentage of uncomplicated and early local peritonitis cases. The increase in these cases is almost offset by the decrease in the number of abscess cases. The decrease in the number of diffuse peritonitis cases may be due in some measure to too strict an observance of my self-imposed rules of pathological diagnosis. Diffuse peritonitis usually comprises about 10 per cent of all cases in a series of this nature. If it is higher than this one should be suspicious. But it is not the frequency of its occurrence that interests us—it is its mortality. (See Chart XI.)

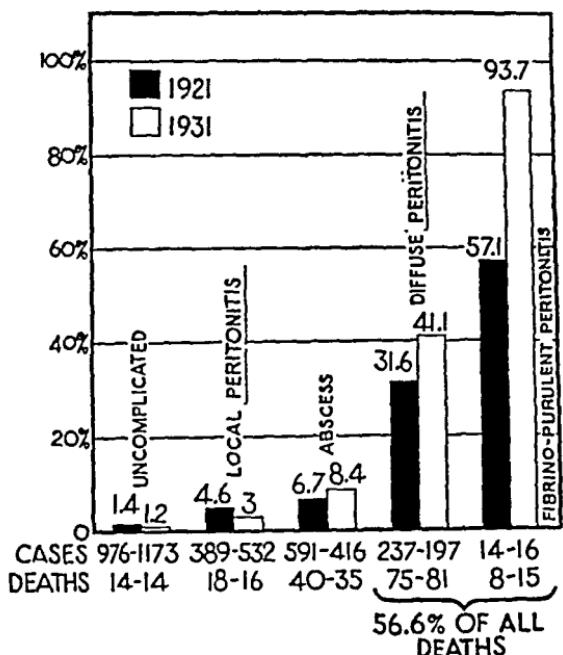


CHART XI.—Mortality according to pathological types.

The mortality in the various pathological groups is shown graphically. It is an old story. It has been reiterated by many authors. Fifty-six per cent of all persons who died in this series fell into the diffuse and fibrino-purulent peritonitis groups.

SUMMARY

From this mass of statistics certain conclusions can be drawn. Their significance should not be overrated, but they should be of some practical value if checked from time to time by further surveys.

1. Between 40 per cent and 60 per cent of hospital records are still deficient in some important respects. More complete records would greatly aid toward a more accurate and complete knowledge of existing problems and hence toward their solution.
2. There has been a considerable rise in the mortality among the older age groups, possibly because of the recent period of economic stress.

3. The New York City public is seeking hospitalization earlier in their attacks of appendicitis than formerly, but a large proportion of them still expect their attacks to subside and are probably freezing their right lower quadrants.

4. It is encouraging to note that in these fourteen hospitals definite improvement has been made towards shortening the period of operative delay.

5. In spite of these evidences of progress the mortality rate still remains too high—7 per cent.

6. No light has been cast on the cathartic problem because of a regrettable lack of information.

7. The mortality in the simpler pathological groups is apparently approaching an irreducible minimum. In the diffuse peritonitis group it is conservatively estimated to be over 30 per cent. In the fibrino-purulent peritonitis group it is somewhere between 50 per cent and 95 per cent.

CONCLUSION

I have purposely avoided any discussion of when or when not to operate, what type of incision or anesthesia to use; when and why and how to drain; how to treat diffuse peritonitis with its accompanying paralytic ileus. These questions have been elucidated by others, and do not lie within the scope of this paper. This survey has been presented with the hope that it will not fall on barren ground. What method of attack should be adopted in dealing with the problem of appendicitis is a question which we, the medical profession, must determine.

The first step must be an honest confession that our record in New York can be improved upon. The second one should be an individual and yet united effort on the part of each hospital group to do something about it. A great deal can be accomplished by a frank exchange of views at staff conferences held at regular intervals. Here each fatal case of appendicitis can be discussed from all angles—the completeness of the record, the correctness of diagnosis, the

quality of judgment and surgical technique, the type of post-operative care, the cause of death and post mortem findings. This is the regular practice at some hospitals but it should be done universally. It is largely by sharing his successes and failures with others that the individual gains in knowledge and experience; and in the last analysis the responsibility lies squarely on the shoulders of the individual.

To carry this thought still further to the third step, it would be of real educational value and a great step forward if every hospital would voluntarily agree to make a concentrated study of acute appendicitis for one year—to take histories and keep their records in a uniform way, to classify all cases pathologically according to some prearranged standard that would be acceptable to all, and to make a detailed report at the end of this time. These reports could be made directly to a non-partisan committee with authority to review and publish their findings. This would supply an excellent basis for comparison with future reports—for future reports would necessarily have to be made in order to observe progress.

Before closing, may I say a few words in defense of the family physician. This individual has received—and unjustly so—a large share of the blame for the factor of delay in acute appendicitis. The diagnosis of appendicitis is *not always easy*: in fact, we all know that at times it may baffle the most able and experienced. Many of us are inclined to forget the blessings of the hospital appointments which we are fortunate enough to enjoy. The "local doctor" who is not so blessed should not be blamed. It is a reflection on our system of medical education that we do not share with others the opportunities of equipment and experience found in our hospitals. The exercises of the Graduate Fortnight are doing much in an educational way. But it is unfortunate that the "local doctor" does not see the gangrenous ruptured appendix, the peritoneal cavity full of pus, the dilated paralyzed intestines, and feel the failing pulse of the patient who has spent several days with an icebag.

on his right lower quadrant. One does not learn by listening to words. Our strongest impressions are created by actual observations. What really counts is the practical and tragic experience of seeing these patients on the edge of the grave.

DISCUSSION

Dr. William W. Herrick: Dr. Krech deserves a great deal of credit for the completion and for the clear and convincing presentation of a very important task. Faced with the fact that the mortality from acute appendicitis in our more representative hospitals is 7 per cent, we must realize that the mortality in the community at large is probably higher. In appendicitis we have a disease which, with ordinary diagnostic and surgical skill is presumably remediable, and yet appendicitis has a mortality quite as high as that of enteric fever, a disease for which we have no remedy. This state of affairs, indeed, deserves a searching of method on the part of those who teach medicine, of those who practice medicine and of those who are practiced upon.

I am sure that as a student and as an intern, I had no adequate instruction in the dangers of abdominal pain or in the care essential in its management. Teachers of medicine are but human. We tend often unconsciously to suppress our errors of diagnosis and of operative judgment and technic, when those errors should be exploited for the benefit of the student. In every senior medical course and in every hospital particular emphasis should be laid upon mistakes in diagnosis and upon their clinical and the pathological aftermath.

Another factor in the mortality of appendicitis is the common practice of making too few house calls. It was the practice of an earlier day to see the patient with any acute condition daily, or perhaps twice a day. Now with the economic pressure, the patient does not crave the medical attention that he used to, neither does the physician wish to force upon the hard-pressed patient services which he thinks may not be necessary. The physician is inclined

to leave some of the responsibility on the patient, to say: "If you are not all right tomorrow, let me know and I will come again." In the question of an acute abdominal disorder, such an attitude may mean disaster. A way to avoid this is to enforce early hospitalization of cases of the acute abdomen which cannot be provided with adequate facilities for care at home, a care which may include hourly observation, with appropriate laboratory procedures.

Another source of danger is in our own processes of reasoning. These brave many possibilities of error. The method of logic which we so often must apply in diagnosis, *per exclusionem in ordine*, is so beset by error that frequently the single mind endeavoring to make a diagnosis goes astray. I believe it was Sydenham who said that there are times when one's faculties are holden from him; that is, when the fine coordination of brain and sense and hand is not operative at an efficient pitch and when through fatigue or what you will, mistakes of observation and of interpretation and of judgment creep in.

In diagnosis of abdominal pains such a situation can be shunned by the consultation. The surgeon and the medical man should share the responsibility for the diagnosis of the acute abdomen.

On the side of the laity, I think there has been an increasing, shall I say, disrespect for appendicitis. The average citizen considers it a fairly simple, straightforward matter, one that can be remedied by almost any surgeon. He is a little lax in sending for his physician and in the use of cathartics. Some attempt to re-educate the laity along these lines seems desirable.

Again the public should recognize one point of utmost importance, namely, that an appendectomy, while it may be a very simple operation, can be one of the most complex and difficult procedures, demanding all the skill and resource of the surgeon. Appendectomy should be entrusted only to surgeons thoroughly competent. A rule enforced by some appropriate organization should provide that major surgery of this type be done only by those thoroughly

qualified by training and experience. I would like to sum up the medical point of view by saying that there should be more adequate instruction in the subject of abdominal pain, and in the results of mistakes in its diagnosis and treatment. More frequent visits should be made in the home when the acute abdomen is under consideration. Each case of abdominal pain should have the benefit of both the medical and the surgical consultation. Early hospitalization of cases of this kind should be enforced, the laity instructed in the dangers of acute appendicitis and in the necessity of placing its management in the most competent of surgical hands.

Dr. John A. Hartwell: Mr. President, Dr. Krech, Dr. Parran, Fellow Guests of the Academy: I am afraid that I shall speak more as one who is retired from the practice of surgery than from an active surgeon's viewpoint. First I wish to comment upon the fact that the Academy possibly felt a little too chastened over a recent experience that was connected with a similar study to this called the study on maternal mortality. There were certain events connected with that which left an undying impression upon the minds of those of us who took part in it.

I rather regret that we did not advise Dr. Krech to entitle his paper, "The Problem of Acute Appendicitis in New York City—An Outgrowth of the Study on Maternal Mortality. A Challenge by the Obstetricians to the Physicians and the Surgeons," and then I think we would have had this hall filled; particularly if we had released this paper to the press, and it had appeared on the front page of all the papers this morning as: "One out of every fourteen cases of acute appendicitis dies. What are the surgeons going to do about it?"—or something of that sort.

We were severely criticized for the maternal mortality report because it did get out. It was not intentionally that this was done, but a good many of us felt that it had been a good thing because it did attract attention, and also it aroused the obstetrical portion of the profession to the fact that something should be done about it.

It is incumbent upon the Academy to see that this work yields results, for when 1,100 persons die in this city of appendicitis every year, it is a matter of major importance and becomes pretty nearly a public health problem. And when we find, as we do that the death rate is constantly rising from it in spite of the fact that patients have come earlier in 1931 than they did in 1921, it shows we are not going to conquer the problem entirely by getting all the people to come to the surgeons earlier. There is another element in it. And when we realize that when one is past the age of fifty, though it is rare that he has appendicitis, his chances of living are only about three in four, it is a very serious problem.

Too, Dr. Herrick pointed out, it should be remembered that these statistics are taken from fourteen of the Grade A hospitals and probably represent the highest type of treatment.

We don't know what the minimum death rate of acute appendicitis ought to be, but we do know that 7 per cent is too high, just as we know that the maternal mortality rate was too high, and since that report was published, definite steps have been taken to see that an improvement has been made in which the Department of Health is taking a part by having appointed an Advisory Obstetrical Council, which council is now engaged in studying the recommendations contained in the Academy report and endeavoring to put them into practice.

Another factor that Dr. Krech brought out is that the records, even in our best hospitals, are not as good as they should be. We do not like to emphasize that because these hospitals were very courteous and co-operative in giving every opportunity to Dr. Krech to study their records, but at the same time they like to know where they may profit and it is our experience that the hospitals eagerly accept any knowledge that will be of benefit.

It was very apparent that the uncomplicated pathological process ran parallel in each instance to the earliness

with which the patient came to the operating room. Early, the disease is a comparatively simple problem in the majority of instances, but even here there is enough trouble to cause a very considerable death rate.

The total number of cases was about 4,500 in the two years, a little over 2,000 in each year. That is a goodly number to make a careful study of.

What can we do about it? How can we proceed? We obviously can't proceed unless we can arouse interest. In the case of maternal mortality, we have to acknowledge, frankly, the profession was driven by the laity. The report came out and it was largely instigated by lay organizations and the profession was aroused only when the situation was emphatically called to their attention.

If an undesirable condition exists in appendicitis, it probably exists in a great many other surgical conditions. If we are satisfied with any bad condition that exists, we don't get any further. There are apparently many unnecessary deaths from appendicitis and it is certainly the duty of the profession to see that those unnecessary deaths do not occur.

Dr. Krech has made one specific suggestion as to how we should proceed; namely, that we ask all the hospitals to co-operate in an intensive study of the condition of appendicitis, keep their records fully and have those records analyzed by an impartial and carefully selected committee and reported upon to see exactly where there are factors that have been responsible for death that might be eliminated.

There are, somewhere along the line, elements that we may get rid of if we know all the facts and everybody's mind is intent upon it, and when there are 1,100 persons each year dying in this city of this disease and when the mortality in the acute condition rises as high as 7 per cent, we certainly should take steps to see that improvement occurs.

How shall we proceed to do this? Well, I suggest, Mr. President, that since the Academy has introduced the subject—and it really has been an outgrowth of the report on

maternal mortality—that the Academy take upon itself the responsibility through one of its committees to launch a study of this disease and possibly other surgical conditions along the same intensive lines that the study of maternal mortality took and learn wherein we can improve the situation. It is not worth while to do the hard work that Dr. Krech has done over two years, possibly longer, with the co-operation of fourteen hospitals and then have the paper simply filed away and forgotten. Such a work is only justified if it lead to some effort to improve the conditions that it describes, and I trust that the Academy will seriously recognize its responsibility and lead towards setting up a procedure such as Dr. Krech describes in the paper for making the intensive study that is necessary to be made.

For example, why did some 30 to 40 per cent of these patients get to the operating room only on the third and fourth day? Was it because they didn't inform anybody that they were ill? Was it because of the difficulties, the inherent difficulties of diagnosis, which is perfectly possible? Was it because someone in the line was careless, didn't take trouble enough to find out the situation? What were the factors that led to delay?

Again, what were the factors that caused the deaths in the cases where there was a local abscess, a condition that, as Dr. Krech pointed out, ordinarily is fairly easily dealt with, but in some instances may tax the best surgeon's ability? A complete analysis of that sort should lead to an improvement in the situation, and unless we accept that responsibility, I do not feel that we have done our full duty.

I wish to thank Dr. Krech in the name of the Academy for having undertaken this work and pushed it forward to this extent and made the suggestion that we go on with it.

Dr. Thomas Parran, Jr. (Albany) : Mr. President, Dr. Krech, Fellow Members of the Academy : In the very cryptic statement of Dr. Krech as to the reasons why he undertook this study, I think very few of us have appreciated the enormous work involved. When we consider the task which he undertook some three years ago of analyzing the raw

data from these fourteen hospitals, of classifying and transcribing and interpreting these data, it is very difficult to appreciate the extent of the contribution he has made.

Many of us are familiar with statistical studies carried out by organizations of one sort or another, but it is quite rare, I think, to find a physician in practice, a surgeon, who has the time, the inclination, the ability and the energy to lift his eyes from the scalpel to the community problem with which he is dealing, and attempt to answer some questions in relation to it. This Dr. Krech has done with appendicitis in this city.

I think none of us should mistake the fact that this is a real problem, that appendicitis in its influence upon the health of the community is a very significant factor.

Reference has been made already to the discussions, the acrimonious discussions, I might even say, concerning maternal mortality in this city, and yet what are the relative losses as between deaths from puerperal causes and appendicitis? Last year in New York City, there were 665 deaths from all puerperal causes and 1,149 from appendicitis.

Let's compare a few more causes of death. Measles in the same year, 213; whooping cough, 129; scarlet fever, 59; diphtheria, 86; typhoid fever, 70; while appendicitis accounted for 1,150 deaths in this city. More than that, the great bulk of these deaths occurred in the younger and, therefore, the most productive age group, which lends even greater significance to the deaths from this cause. Seventy per cent of the deaths occurred under forty years of age.

Dr. Krech, it seems to me, was very modest in saying that his was not a scientific paper. Perhaps it was not in the sense that a surgeon considers a paper to be scientific, but actually it is a very scientific contribution. It is the first broad-scale study of the appendicitis problem in this city and as such, I think is a distinct scientific contribution, and one to which I hope the widest publicity will be given. I hope the facts which have been ascertained will be disseminated widely among the public and among the profession.

The truth of the matter is that we are making no progress whatever in regard to this appendicitis problem. We are familiar with progress which has been made in reference to many other diseases and conditions, and yet in regard to this very important disease, we are making no progress whatever. We are faced with a constantly increasing death rate.

Dr. Krech was very soft in some of his criticisms, it seems to me. He referred rather casually to the value of vital statistics data. Well, when he discussed more in detail the value of the hospital data, I think he proved that neither one of them is very good. The value of any vital statistics records or hospital records does not go beyond the accuracy with which the original entries are made. Many physicians, I know, place very little value on the data gotten out by health departments, but remember that the lack of value is due to the lack of accuracy of physicians in recording definitely the cause of death. As we look over these data, we would assume that nobody outside of the ward room dies of syphilis. We would assume that nobody except the charity patient ever died of alcoholism, simply because doctors hesitate to put down for their private patients these two and other causes of death.

When we come to study the hospital records in these 14 hospitals, time after time, Dr. Krech shows the data are lacking for 60 or 70 per cent of the cases. In other words, a large proportion of the records mean nothing. He has been very charitable in not pointing out which of those hospitals are the greatest offenders. I think a very significant service can be rendered to the staffs of those hospitals, a service which I hope they will ask Dr. Krech to render to them, by pointing out how they stand in reference to the other hospitals concerned. I hope some representatives of the surgical staffs of the hospitals are here tonight and that you will not lose this opportunity to find out from Dr. Krech wherein your records are lacking in comparison with these other institutions.

One of the discussors has said that this is a public health problem. Quite true, and yet I am very much gratified that

a recommendation is not made primarily for some action by a health department. It seems to me that in this instance there is an opportunity for the hospitals concerned, the surgeons concerned, under the aegis of such an organization as this to make a thoroughgoing study, using uniform records to ascertain some of the unknown factors in this situation.

We do not know why it is that the male is 50 per cent more susceptible to appendicitis than the female, a very important question, it seems to me, to which we should find an answer. We do not know why the number of cases and the number of deaths in September double those in December and January. What are the factors which contribute to this selective sex incidence and the selective seasonal incidence of appendicitis? Broad epidemiological studies are obviously needed on those two facts which may throw some light on prevention.

I think that all of us recognize if appendicitis is recognized early, promptly operated upon, the mortality is about one-seventh, as shown by these figures, of the average mortality. Here there were 1,149 deaths last year in this city. Certainly that should be reduced to 100 or 200, if the proper effort is brought to bear upon it.

It seems to me that here is another great opportunity for service on the part of this organization to study thoroughly this problem. A splendid start has been made. Much more data are needed and can be assembled, the results of which, I am sure, will mean lives saved, deaths reduced from this cause in this city.

Dr. J. A. McCreery: I have been rather on the side lines, perhaps, in this study of Dr. Krech's. I have gone over with him his books of records from the different hospitals, his master charts, and have discussed with him at considerable length his findings and thoughts on his report. I don't think that the Society quite realizes the amount of time, the amount of careful thought that has been put into this study.

There is one point which Dr. Herrick brought out which I think needs emphasis and that is the question of the

instruction of the undergraduate and perhaps to a somewhat lesser extent of the intern in the subject of the acute abdomen and of the acute appendix. Dr. Krech has shown tonight that the acute appendix is one of the major causes of death in the City of New York in the course of a year, and yet as we look over the courses of study in the Grade A medical schools, we are forced to realize that through the increased demands for time on the part of all departments, the amount of time that can be given to the basic subjects—which perhaps those of us who are in general practice feel are of more importance—is being cut down. In one school the amount of time which has been devoted to the subject of appendicitis has been cut down 80 per cent in the last few years.

I know it is hard to squeeze a few more hours into the curriculum, but I do feel that if in the future it will be possible to give more time to these acute conditions, the end results as shown in mortality and morbidity figures, will be very much improved.

Dr. C. W. Crampton: Mr. President, I have been very much instructed by the speakers this evening and there have been many points which seemed to me of considerable importance, one of which is the point mentioned by Dr. Hartwell. But there is an apathy in the medical profession with reference to this point of appendicitis. I think twenty years ago the subject was brought out to a far greater audience and twenty years ago a great deal of the discussion was of an acrimonious nature by medical men against the surgeon, and they were answered in kind. I recall, I think many of you will recall, many such sessions.

I should like very much to hear if any of the speakers can add to our knowledge of the etiology of this disease. It is perhaps acknowledged to be an infection. I am very much interested in the bacteriology of this disease, in its immunology. Very little has been written, but some things have definitely been written in the last fifteen years on that subject. I should like to know if there is any evaluation of these points.

I should like very much to know, for I am one of the least of those who is sometimes called on in preventive medicine to give advice, how to avoid disease, how the public may be instructed to avoid such things as appendicitis. I should like very much to know more of the preventive side of this whole matter and if there is not time tonight, if this is to be referred by the Academy to its appropriate committee for energetic and vigorous pursuit, I suggest a very strong effort be made to develop a preventive side of this subject, its bacteriology, its immunology, as a very positive element in the handling of the whole thing from the standpoint of organized medicine.

Dr. G. W. Kosmak: Well, Mr. President and Members, I have been very much interested in what Dr. Krech has said and also in the general tenor of his paper, because he has taken a precaution to avoid some of the pitfalls of the other committee.

I noticed that he was very careful not to stress one factor in his investigation which gave the other committee a great deal of trouble and which created a good deal of disturbance, namely, that of preventability. I trust that when a new committee takes up its study, they will have the courage to investigate this particular phase of the situation. Although that feature created more or less dissension on the part of doctors in our maternal mortality study, I think it was the one thing which has directed as much attention to the need for reform as anything else.

I do not know whether I would have the courage to assert here what Dr. Krech failed to assert, or at least I didn't get it, that in these deaths there must have been a certain number that could have been prevented not by earlier attention perhaps, but what might be called proper attention. These, I know, are debatable points, but unless we have the courage to attack them and to bring them to the front, we will not get far with our remedies.

That is a thought which I had in mind as Dr. Krech spoke, and I trust that it will not be forgotten by the new

committee which is to investigate further this particular subject.

Dr. Edwin G. Ramsdell (White Plains) : Mr. Chairman, before referring to the analysis of my own series of cases of acute appendicitis, I cannot refrain from a word of appreciation of the tremendous amount of work done by Dr. Krech in studying the enormous material from 14 different New York hospitals.

He has impartially, and with meticulous care, gone over the records of these cases in order to give us these interesting figures.

The object of my presentation is to contrast this study of Dr. Krech's with an analysis of 530 cases of acute appendicitis operated by one man, with a more or less uniform technic, in a community in which conditions can be more easily controlled than in New York City.

These cases were operated at the White Plains Hospital which serves a population group of 50,000 people and a group of doctors to whom the importance of early diagnosis and early operation has been repeatedly emphasized.

In conclusion I would like to refer to the total number of cases of acute appendicitis operated at the White Plains Hospital during the period covered by this study. There have been operated by other members of the Staff 775 cases with 28 deaths, or a mortality of 3.6 per cent. Including my own group of 530 cases the total number is 1305 cases, with 41 deaths, or a mortality of 3.1 per cent.

There are three distinct impressions which have been left with me as a result of this experience.

First, the findings at operation so often show a more extensive pathology than was indicated by the clinical symptoms.

Second, the outstanding factor in the appendicitis problem is early diagnosis and early operation.

Third, all credit should be given to the medical men of the community, the family doctors, who see these cases at the onset and get them to the hospital in time for early operation.

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PROCEEDINGS OF ACADEMY MEETINGS

FEBRUARY

STATED MEETINGS

February 7

- I. EXECUTIVE SESSION—*a.* Reading of the Minutes; *b.* Election of Trustee; *c.* Election of Members.

- II. PAPERS OF THE EVENING—*Symposium: The Facts About X-Ray and Radium Therapy;* *a.* Principles and limitations, George T. Pack; *b.* Benign and malignant lesions of the female reproductive tract, Howard C. Taylor, Jr.; *c.* Present status of cutaneous x-ray, Grenz-ray and radium therapy, Anthony C. Cipollaro; *d.* The Roentgen ray treatment of diseases of the nervous system, Cornelius G. Dyke.

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

February 21

THE FIFTH HARVEY LECTURE, "Specificity in Relation to Hormone and Other Biological Reactions," E. C. Dodds, Director of the Courtauld Biochemical Laboratory, The Middlesex Hospital, London.

SECTION MEETINGS

SECTION OF SURGERY—February 1

- I. READING OF THE MINUTES.
II. PRESENTATION OF CASES—*a.* 1. A case of osteomyelitis of the frontal bone with intracranial abscess; 2. An unusual case of hyperthyroidism; 3. Strangulated inguinal hernia, with intestinal gangrene and perforation. Drainage, and subsequent resection, Howard A. Patterson; *b.* 1. A case of myxedema produced by removal of aberrant thyroid tissue thought to be a thyroglossal cyst; 2. 4 cases illustrating total thyroidectomy for angina pectoris and chronic heart failure, Carnes Weeks; *c.* Pretracheal abscess simulating an acute thyroiditis, Philip D. Allen; *d.* 3 cases illustrating paper, Grant P. Pennoyer.
III. PAPERS OF THE EVENING—*a.* Benign strictures of the rectum, Grant P. Pennoyer; *b.* Pilonidal cysts and sinuses, Lester Breidenbach, H. Lynn Wilson (by invitation).
IV. GENERAL DISCUSSION—Arthur W. Grace, Charles L. Janssen (by invitation), William Crawford White, Ralph Colp.

SECTION OF DERMATOLOGY AND SYPHILOLOGY—February 3

- I. PRESENTATION OF CASES FROM NEW YORK POLYCLINIC HOSPITAL.
II. MISCELLANEOUS CASES.
III. DISCUSSION OF SELECTED CASES.
IV. EXECUTIVE SESSION—Examination of cases is limited to members and their invited guests.

THE NEW YORK NEUROLOGICAL SOCIETY AND SECTION OF NEUROLOGY AND PSYCHIATRY

February 5

- I. PAPERS OF THE EVENING—*a.* An unusual gliotic process of the occipital lobes in Huntington and arteriosclerotic choreas, Charles Davison; Discussion, J. H. Globus; *b.* Psychopathology of time, Paul F. Schilder; Discussion; Clarence P. Oberndorf, Walter Bromberg (by invitation); *c.* Pick's disease—clinical and pathological considerations with report of a case, Armando Ferraro, George Jervis (by invitation); Discussion, Clarence O. Cheney; *d.* Psychosis as a reaction to mental diseases in the family, Lauretta Bender (by invitation); Discussion, Clarence O. Cheney, Bernard Glueck (by invitation).

SECTION OF PEDIATRICS—February 14

- I. PAPERS OF THE EVENING—a. The pseudo-appendicular type of bacillary dysentery (Sonne-Duval, Flexner), Joseph Felsen, A. G. Osofsky, M.A. (by invitation); b. A case of aplastic anemia, Peter Vogel (by invitation); c. Eventration of the diaphragm, John F. Landon; d. A case of dermatomyositis, A. A. Weech (by invitation), Beryl H. Paige.

II. GENERAL DISCUSSION.

SECTION OF ORTHOPEDIC SURGERY—February 15

- I. READING OF THE MINUTES.
- II. PAPER OF THE EVENING—The shoulder, E. A. Codman, Boston (by invitation).
- III. Presentation and analysis of patients with traumatic lesions of the shoulder, E. A. Codman.
- IV. Results of operation on the shoulder, William Darrach.
- V. GENERAL DISCUSSION—Opened by Philip D. Wilson (by invitation).

SECTION OF OPHTHALMOLOGY—February 18

- I. INSTRUCTION HOUR, 7 to 8 o'clock—"The Answer to Blindness," Mr. Elliott S. Humphrey (by invitation), Vice-President, Division for Training and Research, The Seeing Eye, Inc., Morristown, N. J., Morris S. Frank and "Buddy", moving picture film.
- II. DEMONSTRATION HOUR, 7:30 to 8:30 o'clock—a. Slit lamp studies; b. 1. The blind at work; 2. A display of work done by the blind, New York Institute for the Blind, The Light House Institute for the Blind.
- III. SCIENTIFIC SESSION, 8:30 to 10:00 o'clock—a. Reading of the Minutes; b. Case reports; 1. Slit lamp study of a hole in the retina, Emanuel Rosen, Newark (by invitation); 2. Embolism of central retina artery relieved by nitro-scleran, Benj. Esterman (by invitation); c. 1. Blindness—its causes and prevention, Park Lewis, Vice-President, International Society for the Prevention of Blindness, Buffalo (by invitation); 2. Training and care of the blind, Mr. Edward M. VanCleave, Principal, The New York State Institute for the Education of the Blind (by invitation); Discussion, Conrad Berens, Mrs. Winifred Hathaway, Associate Director of the National Society for the Prevention of Blindness (by invitation).

SECTION OF MEDICINE—February 19

- I. READING OF THE MINUTES.
- II. PAPERS OF THE EVENING—a. Presentation of cases, Carnes Weeks; b. Total thyroidectomy for angina pectoris and congestive heart failure, I. Ogden Woodruff; c. Follow-up study of patients with total thyroidectomy, Morris Dinnerstein (by invitation)
- III. GENERAL DISCUSSION—Herrman L. Blumgart, Boston (by invitation), William Barclay Parsons, Robert Levy.

SECTION OF GENITO-URINARY SURGERY—February 20

- I. READING OF THE MINUTES.
- II. PRESENTATION OF CASES—a. Congenital narrowing of the terminal part of the ureter; b. Treatment of infected hydronephrosis by nephrostomy, J. Sturdivant Read.
- III. PAPERS OF THE EVENING—a. The problem of non-calculus uretero-pelvic obstruction, a review of three recent surgical cases, Augustus Harris; b. Aseptic uretero-intestinal transplants, Fedor L. Senger; c. New applications of old methods in the study of abnormal renal morphology, Jean Oliver (by invitation); Discussion opened by Paul Klemperer, Thomas J. Kirwin, Roy B. Henline.
- IV. GENERAL DISCUSSION.
- V. EXECUTIVE SESSION.

SECTION OF OTOLARYNGOLOGY—February 20

- I. READING OF THE MINUTES.
- II. CASE REPORTS—*a.* Cases illustrating the management of anterior surface subcortical fistulas in petrous pyramid suppuration, Mervin C. Myerson, discussion, R. Almour; *b.* Case of otitic meningitis cured, Wm. B. Allen (by invitation); *c.* Case of otitic meningitis with pseudo brain abscess, Max Rabbiner (by invitation).
- III. PAPERS OF THE EVENING—Symposium on oto-rhinogenic meningitis—*a.* Newer concepts on otogenic meningitis, Samuel J. Kopetzky; Discussion opened by James G. Dwyer, Thomas J. Harris; *b.* Forced drainage in the treatment of oto-rhinogenic infections of the central nervous system, Lawrence S. Kubie, C. C. Hare (by invitation); Discussion opened by E. G. Zabriskie.
- IV. GENERAL DISCUSSION.
- V. EXECUTIVE SESSION.

SECTION OF OBSTETRICS AND GYNECOLOGY—February 26

(Program arranged by the Obstetrical Staff of the Methodist Episcopal Hospital, Brooklyn)

- I. EXECUTIVE SESSION.
- II. PAPERS OF THE EVENING—*a.* Introductory remarks, O. Paul Humpstone (by invitation), Senior Obstetrician; *b.* The prevention of puerperal sepsis, Harry W. Mayes (by invitation); *c.* Management of breech presentation (ten years' experience at the Methodist Hospital), Alexander E. Dunbar (by invitation); *d.* Some observations on acute mastitis and breast abscess, Henry T. Hagstrom (by invitation); *e.* Premature separation of the normally implanted placenta, George H. Davis (by invitation); *f.* A study of the respirations in the newborn, Robert A. Wilson (by invitation); *g.* A review of the premature babies at the Methodist Hospital (5 year report), Walter F. Watton (by invitation).
- III. DISCUSSION opened by Charles Hendee Smith, E. Everett Bunzel, Hervey C. Williamson, Meyer Rosensohn.

AFFILIATED SOCIETIES

NEW YORK ROENTGEN SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*—
February 18

- I. PRESENTATION OF INTERESTING CASES by Drs. Rowell, Kraus, Westcott, Irving Schwartz, and Bendick.
- II. PAPER OF THE EVENING—Important considerations in the interpretation of orthopedic roentgenograms, Maurice M. Pomeranz.
- III. DISCUSSED by Lewis Clark Wagner and Henry Jaffe.
- IV. EXECUTIVE SESSION.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*—
February 28

- I. PRESENTATION OF CASE REPORTS—*a.* Abscess of the liver due to Friedländer's bacillus, Henry S. Dunning, Charles T. Olcott; *b.* Primary atrophy of the adrenal glands with Addison's disease, Henry S. Dunning, James A. Moore.
- II. PAPERS OF THE EVENING—*a.* Osteoid-osteoma, Henry L. Jaffe; *b.* Histogenesis of lymphosarcomatosis, J. C. Ehrlich, I. E. Gerber; *c.* Visceral neurogenetic sarcomatosis, Seaton Sailer.

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE
UNDER THE AUSPICES OF THE NEW YORK ACADEMY OF MEDICINE—February 20

- I. Pituitary hormones and the blood sugar level, M. C. Hrubetz (introduced by H. B. Williams).
- II. Influence of ascorbic acid of diet on sensitization of guinea pigs to neoarsphenamine, M. B. Sulzberger, B. L. Oser (introduced by K. Landsteiner).

- III. Low basal metabolic rates obtained by low calorie diets in coronary artery disease.
A. M. Master, H. L. Jaffe, S. Dack.
 - IV. Effect of suprarenal cortical hormone on natural resistance of pituitarectomized rats.
D. Perla.
 - V. Effect of iodine and desiccated thyroid on anterior pituitary of goitrous and thyroidec-tomized rabbits, D. Marine, S. H. Rosen, C. Spark.
 - VI. Passage of human spinal cords containing virus of poliomyelitis to monkeys, M. Brodie.
 - VII. High temperature liver death syndrome, J. E. Sutton, Jr. (introduced by J. E. Sweet).
 - VIII. A new method of determining plasma fibrin, S. Rosenfeld, A. S. Wiener (introduced by B. Kramer).
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MEMBERS ELECTED

February 7, 1935

Harold Lindsay Amoss.....	125 Field Pt. Rd., Greenwich
Burnett B. Benson.....	860 Park Avenue
James M. Bethea.....	660 Park Avenue
Frederick W. Birkman.....	115 East 61 Street
Marshall S. Brown, Jr.....	75 East 55 Street
Thomas Ciaccio Caso	159 East 49 Street
Alexander J. Chilko.....	New Rochelle Hospital, New Rochelle
Agnes Conrad	1215 Fifth Avenue
Irving Alexander Frisch.....	110 East 90 Street
Burke C. Hamilton.....	100 William Street
Clarence P. Howley.....	59 West 12 Street
M. Beckett Howorth.....	125 East 74 Street
Harry Vincent Judge.....	46 Willett Street, Albany
Victor Wesley Logan.....	10 West 58 Street
Currier McEwen	444 East 66 Street
Gordon David Oppenheimer.....	941 Park Avenue
Maurice C. O'Shea.....	145 West 88 Street
Herbert Pollack	73 East 90 Street

OBITUARY

WILLIAM CHITTENDEN LUSK*

1868 - 1934

William Chittenden Lusk was born in Guilford, Connecticut, July 23, 1868, and died of Parkinson's disease in New York City on October 24th, 1934. He was the son of

* Read before the Society of Alumni of Bellevue Hospital December 5, 1934.

William Thompson Lusk, eminent obstetrician, and brother of Graham Lusk, eminent scientist.

Doctor Lusk was Consulting Surgeon to Bellevue Hospital, St. Vincent's Hospital and the Manhattan State Hospital, a member of the Society of Alumni of Bellevue Hospital, a Life Member and Founder of the American College of Surgeons, Fellow of the New York Academy of Medicine, member of the American Medical Association, of the Medical Societies of the State and County of New York, and of the New York Surgical Society.

Doctor Lusk's early years were spent at the home of his grandfather, Simeon Baldwin Chittenden, in Guilford, Connecticut, where he attended the Guilford High School. He then went to the Polytechnic Institute of Brooklyn. When he had finished there, he traveled for a year in Europe. In 1886, he entered Yale, where he had a notable career, and was graduated in 1890 with the degree of A.B. That fall he entered Bellevue Hospital Medical College and graduated in 1893 at the head of his class. He served as intern on the Third Surgical Division of Bellevue Hospital from 1893-1895. After completing his service in Bellevue Hospital, he immediately engaged in private practice, hospital work, and teaching in his Alma Mater. His first appointment in the College was as Assistant Demonstrator of Anatomy: later he became Assistant to the Chair of Surgery. In 1898 when Bellevue Hospital Medical College and the University Medical College were consolidated he was appointed Lecturer on Anatomy and Demonstrator of Operative Surgery, and in 1903 Professor of Clinical Surgery. After his disease began Doctor Lusk found teaching burdensome and resigned his college connections. In 1916, the College honored him by reappointment as Professor of Clinical Surgery and, again in 1933, as Professor Emeritus of Clinical Surgery. In 1932 the Alumni Federation presented Doctor Lusk with the medallion of the New York University Meritorious Service Award.

Doctor Lusk's hospital affiliations at various periods in his career were: Visiting Surgeon to the Almshouse and Workhouse hospitals, Assistant Visiting Surgeon to the Third Surgical Division of Bellevue Hospital, Assistant Visiting Surgeon to St. Vincent's Hospital; in 1912 he was transferred to the Fourth Surgical Division of Bellevue Hospital as Assistant Visiting Surgeon; in 1922 he was promoted to Visiting Surgeon and on his resignation from that Division in 1927 he was appointed Consulting Surgeon.

A former student and intern recalls his association with Doctor Lusk in this wise: Though he asked a good deal of us, he never spared himself. Often he would spend an entire evening at the College preparing for his lecture next day. In the hospital he devoted his entire time to the service and his students. He was there night and day. No one who served under him will ever forget his unfailing courtesy, his kindness, and his appreciation of good work.

Doctor Lusk was endowed with that rare combination of scientific imagination and infinite capacity for detail. Had the Fates not decreed otherwise, he would have become a leading investigator of surgical problems. In spite of his affliction, his bibliography comprises some 25 titles. His first important paper entitled "Remarks on a Frozen Section of The First Stage of Labor" appeared in the British Medical Journal in 1898. Then followed, among others: Excision of the Rectum for Cancer; J. Surg. Gyn. & Obstet., 1908, vii, pp. 113-226; The Anatomy of Spinal Puncture; Ann. Surg., 1911, LIV, 449. A Thoracic Aneurism Treated with Gold Wire and Galvanism; Ann. Surg., 1912, LV, 789.

When the War came Doctor Lusk's disease had progressed so far that active service was out of the question, but, determined to "do his bit," he devoted himself to an intensive study of the value of chinosol as a disinfectant and healing agent. This problem held his interest throughout the remainder of his life.

Early in life, Doctor Lusk developed many interests outside of his profession. He had an innate love of horses and the great outdoors, especially mountains. As long as his health permitted, he found recreation on the bridlepaths of the Park. His camera and fishing rod were his constant companions on his vacations.

Doctor Lusk was intensely social and delighted to entertain his friends. Former members of his house staff will recall the Christmas dinners he sent down to them in the hospital. Other friends cherish the memory of delightful evenings spent in his home. But his kindness and courtesy and generosity were not reserved for his intimates, they reached all with whom he was brought in contact. During the funeral services held in his late home an old man waited in the street, with bowed head, until the body of his friend had started on its last journey.

Tragic as was the illness that cut him off from professional work at the time of his greatest usefulness and promise, and hard as it is to understand, or become reconciled to, such a dispensation, yet that very illness brought fulfilment of life and character. He dedicated his life to his fellow-men and to all that was finest and best in his profession, adding full measure to the splendid traditions of his family.

WARREN COLEMAN.

ARTHUR M. WRIGHT.



DEATHS OF FELLOWS OF THE ACADEMY

VALENTINE, JULIUS JOHN, M.D., 745 Fifth Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons in 1905; elected a Fellow of the Academy October 17, 1912; died, March 11, 1935. Dr. Valentine was a member of the County and State Medical Societies, the American Urological Association, and a Fellow of the American Medical Association, the American College of Surgeons and a past president of the Pan-American Medical Association and of the New York section of the American Urological Association. At the time of his death Dr. Valentine held positions as Professor of Urology at the New York Polyclinic Medical School and Director of Urology at Morrisania Hospital.

WALTER, JOSEPHINE, M.D., 50 Central Park West, New York City; graduated in medicine from the Woman's Medical College of New York Infirmary in 1882; elected a Fellow of the Academy April 2, 1891; died, February 26, 1935. Dr. Walter was a member of the County and State Medical Societies and of the Society of Associated Alumni of Mt. Sinai Hospital. She was Consulting Physician to the New York Infirmary for Women and Children and Consulting Gynecologist to Montefiore Hospital.



BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

VOL. 11

APRIL, 1935

No. 4

ANNUAL REPORT FOR THE YEAR 1934

REPORT OF THE COUNCIL

The Council has recorded elsewhere and in permanent form the inestimable and irreparable loss which the Academy suffered in the death on January 8, 1934 of Dr. Linsly Rudd Williams, its first Director, who served our interests for exactly ten years. The service which was held in Hosack Hall as a testimony of the affection and esteem in which he was held by the Fellows showed by the attendance of many others beside the Fellows that his influence extended far beyond purely Academy interests.*

The Council appointed Dr. John A. Hartwell to fill the vacancy in the Directorship, a position which he had filled as Director ad interim during Dr. Williams' illness.

The Academy during the year took several actions concerning medical matters which were before the state legislature for consideration. The Governor was urged to put into effect legislation which would correct the evils connected with Workmen's Compensation along the lines of the recommendations made by the Governor's Committee on Workmen's Compensation of which Dr. Eugene H. Pool was chairman. This bill was introduced; it was not reported out of Committee but was left in such a position as to make favorable action probable at a later time.

* A Memorial Volume containing the addresses given at the service and Resolutions adopted by the Council and Academy Committees as well as tributes from the press and organizations at home and abroad has been published by order of the Council.

Active part was also taken in enacting into law the bill providing for a cooperative hospital service fund.

A resolution was also passed urging the Federal authorities to take action to forestall the burdening of the Federal budget with innumerable claims for compensation under Workmen's Compensation Act by persons employed under the C.W.A.

The question of the publicity which arose in connection with the Maternal Mortality Report which appeared late in 1933 was given careful consideration by the Council and a special Subcommittee. Provisions were made whereby any undesirable elements in this situation would be avoided in the future, but the Council recorded its opinion that the publicity was demanded by the actual conditions revealed in the report, and had been a factor in putting in motion remedial actions.

Some time after the amended By-Laws concerning the designation of Fellows in a particular field of medical activity and the election of Members who might later qualify for Fellowship also in a particular field were put into effect, the Council voted that the situation be reviewed with the purpose of eliminating possible undesirable factors. With the helpful cooperation of the Sections, their Advisory Committees and the Committee on Fellowship, amendments to the By-Laws and changes in the methods of procedure were adopted which corrected these. The wish of the Academy to aid in requiring a proper qualification of those who desire to be known as especially trained in a given branch of medical practice or science has now been satisfactorily accomplished in so far as its membership is concerned. A candidate, if successful, is elected as a Member. At such time as he can present evidence to the Committee on Fellowship and the Council, acting with the aid of the Section Advisory Committees that he meets the established requirements, he may be promoted to Fellowship in (the name of a Section or Affiliated Society).

At the instance of Dr. Walter Mendelson, who presented a cap and gown to the Academy, the Council took action on

a long discussed step by voting that the President and the Secretary should appear in cap and gown at Academy meetings.

The attention of the Council was called to the fact that the statue of Marion Sims which formerly stood in Bryant Park was available for erection elsewhere. The needed steps were taken with the Department of Parks through Commissioner Robert Moses and as described in the Bulletin for December, 1934, that beautiful bronze now has a permanent place at the head of 103rd Street between the Academy and the Museum of the City of New York.

The Council approved the selection of Dr. Charles Norris, Medical Examiner of the City of New York, as the recipient of the third award of the Academy Gold Medal—the presentation being made on the occasion of the delivery of the Anniversary Discourse by his Honor Mayor LaGuardia.

There came before the Council only one instance in which the Committee on Professional Standards found it necessary to report a Fellow for consideration of his conduct. This resulted in a vote of suspension for a period of one year as reported in the October Bulletin.

It is gratifying to know that through the conscientious effort of that Committee, the Fellows are cooperating most heartily in striving to raise the ethical standards of the Academy membership to the highest point possible. Neither the Committee nor the Academy will countenance the division of fees.

Many inquiries are received not only from our membership but from those not connected with the Academy as to the proper procedure to follow when difficult decisions are required as to the proprieties in connection with our professional life. The counsel of this Committee has been helpful in solving many such.

There came before the Council many questions of general policy as to the conduct of Academy affairs in these difficult times. The financial policy is determined by the Trustees and is presented in their report, but of necessity the Council

must carry on within the budget as set up by the Trustees. Thus, there arose for decision a question as to what economies would be least disturbing not only to the continuing of present activities which have proved valuable but to the normal growth which is requisite to the healthy development of any institution and without which retrogression is inevitable. The Council backed by the Trustees courageously faced the needs. General economies were instituted. Additional funds were secured by individual effort. It was voted that no essential activity could be curtailed, and each department has been encouraged toward a healthy growth.

The Fellows and Members have given more than generously of their time and effort in making successful the Friday afternoon lectures, the Graduate Fortnight—to the Committee of which and the staff working under them the Council adopted a special vote of thanks—the Section meetings and all other educational activities.

Fulfilment of our hope that there should be an intensive study of the educational value of hospital internships and residencies was realized by the generous contribution of support by the Commonwealth Fund. This study is going forward under the able directorship of Dr. J. A. Curran working with a Committee of Deans, and with hospital and Academy representatives.

Our grave concern has been for the Library. By special effort new additions have been continued and the Council has voted that the Library's growth cannot be curtailed.

The Milbank Memorial Fund again came to our financial aid in keeping up the standard of our publications and the Josiah Macy, Jr. Foundation met the deficit arising from the Graduate Fortnight.

The natural result of all these efforts has been a widening influence of the Academy and there has been a constantly increasing demand for our help in matters of public concern. The cordial relation which has developed between private and governmental agencies is steadily increasing and adding to our responsibilities.

This record of accomplishment has been made possible by the loyal help of many friends and the untiring work of our Fellows, Members and staff. To these, the Council extends its sincere appreciation and gratitude, recognizing that their cooperation has been instrumental in permitting the Academy to meet the obligations laid upon it by long tradition.

BERNARD SACHS, *President.*

REPORT OF THE BOARD OF TRUSTEES

A budget of \$238,504 was approved by the Trustees in December, 1933, representing the probable amount which would be required to carry on the work during 1934. The budget was based on the estimated receipts and the lowest amount for which it seemed possible to operate efficiently. It is gratifying to state that by carefully planned economies the Director and his associates were enabled to make a saving in nearly all departments. Nevertheless, extraordinary expenses connected with the servicing of our invested securities and mortgages, legal fees and expenses connected with the 103rd Street property, brought the total expenditures to \$246,261.21. There was also a decrease from the estimated income of \$239,100 to an actual income of \$237,170.43, thus creating an operative deficit of \$9,090.78. Through the generosity of two of our Benefactors this amount was reduced to \$652.92. By vote of the Trustees, this sum was transferred from the Reserve Fund which has been set aside from unexpended income in the past and thus we are enabled to begin the current year without indebtedness of any kind.

The estimated income and expenses for 1935 show an operating deficit of \$7,758.00 as indicated in the Treasurer's report. We shall continue to exert our best efforts for economies but the Trustees have voted that the activities of the Academy cannot be allowed to suffer and that steps must be taken to secure additional income. If we are to continue the discharge of our increasing responsibilities, it will be necessary to enlarge our endowment or acquire

funds annually to meet expenses. The attention of the Fellows is called to this situation in the hope that they will bear in mind the needs of the Academy whenever an opportunity arises to interest those who are in a position to contribute funds.

The major concern of the Board of Trustees during the year was to safeguard our capital investments and at the same time provide sufficient income to meet operating costs. After a full discussion of the trying situation in which all invested capital finds itself under existing conditions, and with the advice of our Advisory Finance Committee, the Trustees on January 24, 1934, voted to engage an Assistant to the Controller to service our mortgages and The Fiduciary Trust Company to manage our investment securities. The result has been satisfactory.

Gradually, we have terminated the agency of the guarantors in the case of the mortgages without losing in most cases the guarantee if the future restores its value. We have improved the security of the mortgages, bettered the management of the properties and saved the one-half per cent formerly paid the guarantor. These advantages have fully offset the cost of the addition to our staff.

The result of the advice of the Fiduciary Trust Company in servicing our bonds and stocks, in the opinion of the Board has also been advantageous in safeguarding our investments. As is seen by the Treasurer's report, we have sold some holdings at a considerable loss over the book values, but our present position is better than it would have been otherwise and the Trustees voted to continue this service for the ensuing year.

We are pleased to report that the three houses to the east of us on 103rd Street which were purchased in 1930 as a protection to the Academy property and a provision for future growth, possibly the erection of a Museum, have now become self-supporting except for interest on the investment.

Through the contribution of one of our Benefactors, a small start was made toward a medical history museum by

utilizing the lower exhibition room in the extension, where the historical matter already owned by the Academy is now on display.

The Trustees here express their appreciation of the cooperation and efficiency of the Director, the heads of the several departments and their staffs. Without the fine spirit which has prevailed, the efficiency of the Academy would have suffered materially during these trying times.

EUGENE POOL, *Chairman*
Board of Trustees.

BUDGET 1935

Income Estimated

Investments	\$131,682 00
Dues—Members	70,500 00
" —Library	1,120 00
Room Assessments .	14,900 00
Contributions	12,600 00
Bibliography	5,000 00
Academy and Surgical Bulletins	8,800.00
Graduate Fortnight	2,400 00
Bank Interest	250 00
Health Examiner	7,000.00
 Total	 \$253,752 00

Expenses Estimated

Administration—Salaries	\$ 31,864 48
" —Expenses	26,355 52
Building Operation—Salaries	31,511 50
" " —Expenses	15,148 50
Library—Salaries	55,480 82
" —Expenses	25,219 18
Medical Education—Salaries	16,358 00
" " —Expenses	23,162 00
Public Health—Salaries	14,029.00
" " —Expenses	951.00
Medical Information—Salaries	8,494 80
" " —Expenses	5,995 20
103rd Street Property	6,940 00
 Total	 \$261,510 00

ALLOCATION OF FELLOWS' DUES FOR 1935

1. Building Operation—Salaries	\$31,511.50
" " —Expenses	15,148.50
2. Library	14,840.00
3. Subscriptions to Bulletin.....	2,000.00
4. Stated Meetings and Membership Bureau.....	7,000.00
 Total	 \$70,500.00

EUGENE H. POOL, *Chairman.*

The following gifts and bequests have been received during the year:

GIFTS AND BEQUESTS

For Endowment

Purpose	Donor	Amount
General Endowment	Seth M. Milliken.....	\$ 454.97
Library	Rudolph A. Witthaus Estate....	206,937.33
Stafford McLean Fund, Library	Mrs. Stafford McLean.....	3,000.00
Stafford McLean Fund, Library	Mrs. Lucius Wilmerding.....	500.00
Total New Endowment		\$210,892.30

For Current Use

Purpose	Donor	Amount
Academy General Expenses	Anonymous	\$10,000.00
Portrait of Linsky R. Williams	Mrs. Linsky R. Williams.....	1,000.00
Library Publication Fund	Marcia Brady Tucker.....	3,000.00
" " "	Mrs. Linsky R. Williams.....	1,000.00
Books on Dentistry	First District Dental Society.....	500.00
Foreign Scholarships	Mrs. Alexander Cochran Bowen..	4,000.00
Graduate Fortnight	Josiah Macy, Jr. Foundation.....	1,000.00
Medical Information Bureau	Income from Unpaid Contribution.	2,500.00
Health Examiner Publication	Milbank Fund	1,750.00
Director's Fund for Current Expenses	Anonymous	3,437.86
Director's Fund to Reduce 1934 Deficit	Anonymous	5,000.00
Library Books	New York Neurological Society...	1,000.00
Total		\$34,187.86

BUILDING FUND*Received from Fellows:*

1 at \$3,037.49	\$3,037.49
1 at 250.00	250.00
1 at 100.00	100.00
2 at 50.00	100.00
1 at 40.00	40.00
2 at 25.00	50.00
1 at 5.00	5.00
	<hr/>

Received from Edward S. Harkness	13,593.02
	<hr/>
Total	\$17,175.51
	<hr/>

ABSTRACT OF TREASURER'S REPORT

I have the honor to present The New York Academy of Medicine Statement of Assets and Liabilities as at December 31, 1934, as follows:

ASSETS

Cash in Bank and on hand	\$ 33,589.21
Investments:	
Mortgages	\$1,204,825.00
*Stocks (Market \$689,172.50)	825,975.51
*Bonds (Market \$680,792.50)	800,222.75
Real Estate	130,516.65
	<hr/>
Accounts Receivable	1,750.00
Fixed Assets:	
Academy Land and Building	\$2,217,396.91
Library Equipment and Portraits	905,073.10
	<hr/>
Deferred Assets and Prepaid Expenses:	
Estate of Dr. A. C. Powers	\$ 1,513.98
Costs—Foreclosure Proceedings	253.40
Deposits	110.00
	<hr/>
Total Assets	\$6,121,226.51

* List may be reviewed by members upon application to the Director or the Treasurer's office.

LIABILITIES

General Property Fund. Balance Jan. 1, 1934 (including Celine B. Hosack, bequest \$70,000).	\$2,716,948.22
Add: Library Additions for 1934.....	20,425.68
Equipment	13,490.68
New Building Addition	371,605.43
	<hr/>
Endowment Fund, Balance Jan. 1, 1934	\$1,311,510.47
Add: Admission Fees	3,725.00
Proceeds on Sales of Investments	7,772.51
Gift of Dr. Seth M. Milliken	454.97
Miscellaneous	128.31
	<hr/>
	\$1,323,591.26
	<hr/>
Loss through Sale of Securities	308,999.90
	<hr/>
Educational Endowment Fund (Rockefeller Foundation)	1,250,000.00
Library Funds:	
	FOR THE GENERAL PURPOSES OF THE LIBRARY
The Library Fund, Balance Jan. 1, 1934	\$ 93,155.17
Add: Rudolph A. Witthaus Estate	206,937.33
Stafford McLean Fund (1/1/34)	10,000.00
Mrs. Lucius Wilmerding	500.00
Mrs. Stafford McLean	3,000.00
	<hr/>
Sale of Triplicates	1.00
Landon Carter Gray Fund. Established 1911	
\$46,596.05 Allocated by Trustees	\$3,403.95
Everett Herrick Fund. Established 1915	50,000.00
Anna Woerishoffer Fund. Established 1897	25,000.00
Horace Putnam Farnham Fund. Established 1889	15,000.00
German Hospital and Dispensary Fund. Est. 1903	10,000.00
James S. Cushman Fund. Established 1897	3,000.00
Orville Ranney Flower Fund. Established 1897	1,000.00
William T. Lusk Fund. Established 1893	1,000.00
Albert William Warden Fund. Established 1906	1,000.00
J. Marion Sims Fund. Established 1896	100.00

LIBRARY FUNDS RESTRICTED TO BOOK PURCHASES

Philipine Meyer and Ernst Jacobi Fund. Est. 1915	14,486.00
Ernst Krackowizer Fund. Established 1897	2,000.00
Austin Flint Fund. Established 1910	1,200.00
Merrill Whitney Williams Fund. Est. 1895	220.00

LIBRARY FUNDS RESTRICTED TO PURCHASE OF SPECIAL BOOKS

Lucius Duncan Bulkley Fund. Income to be used for the purchase of books on Cancer or main- taining Cancer Library. Established 1929	5,000.00
F. E. M. Bullowa Fund. Income to be used for the purchase of books relating to the Ductless Glands. Established 1919	1,000.00
James P. Tuttle Fund. Income to be used for the purchase of books on Diseases of the Digestive Tract. Established 1913	1,000.00
A. L. Northrup Dental Fund. Gift of the First Dis- trict Dental Society, N. Y. Income to be used for the purchase, binding and care of books on Dentistry. Established 1897	250 00
Academy Rare Book Fund	12,146 10 \$ 457,995.60

FUNDS RESTRICTED TO SPECIAL USES

Thomas W. Salmon Memorial Fund from Thomas W. Salmon, Inc.	\$ 100,000 00
Edward N. Gibbs Memorial Prize Fund. Income to be awarded to a research worker on Diseases of the Kidney. Established 1901	21,482 57
Public Health Relations Reserve Fund	18,268 21
Alfred Lee Loomis Entertainment Fund. Established 1895	11,000.00
William S. Halsted Fund. Established 1930.	10,000.00
Louis Livingston Seaman Fund for Bacteriology and Sanitary Science. Established 1932	7,007.22
Wesley M. Carpenter Lectureship Fund. Income to be used annually for one medical lecture. Established 1891	5,813 09
Hermann Michael Biggs Lectureship Fund. Received from Mrs. Biggs and New York Tuberculosis and Health Asso- ciation in 1930. Income to be used for lectures on Public Health and Preventive Medicine.	4,000.00
Academy Medal Fund (Dr. Samuel McCullagh)	3,000.00
L. Duncan Bulkley Lectureship Fund. Income to be used for lectures on Medical Aspects and Treatment of Cancer. Established 1929	2,000.00
Ernst Hermann Arnold Fund. Income to be used for Section on Orthopedics. Established 1932	554 31
Building Fund—Balance January 1, 1934	\$369,086.07
Add: Receipts from Subscribers	17,175.51
	\$386,261.58
Less: Construction and Equipment transferred to Academy Building and Equipment ..	384,547.06
	1,714 52

Reserve Fund, January 1, 1934	\$ 73,910.50
Transfer for Endowment Fund. \$ 45.00	
Alterations, 10-14 East 103 Street 13,742.01	
Health Examiner 568.43	
Certificate Fund 275.00	
Deficit, year 1934	652.92
	<hr/>
Accounts payable (1934)	6,307.35
Employees Annuity Reserve	4,731.55
Deferred Income (1935 Dues)	170.00
Trust Funds	21,493.58
	<hr/>
Total Liabilities	\$ 6,121,226.51
	<hr/>

STATEMENT OF INCOME AND EXPENSE INCOME

Investments	\$ 108,093.75
Dues Members and Library	72,336.62
Room Assessments	14,181.09
Contributions	19,187.86
Bulletins	9,841.06
Bibliography and Photostat	5,183.24
Health Examiner	5,913.38
Bank Interest and Miscellaneous	1,498.79
	<hr/>
	\$ 236,235.79
Restricted:	
Library Funds	\$15,938.76
Graduate Fortnight	1,000.00
Reserves consumed	4,761.49
	<hr/>
	\$ 257,936.04

EXPENSE

Administration and General	\$53,986.25
Building Operation	51,799.64
Library	78,604.04
Medical Education	27,154.77
Public Health	14,509.38
Sections	8,625.72
Medical Information and Health Examiner	15,745.69
103rd Street Property	8,163.47
	<hr/>
Deficit—Year 1934	\$ 652.92

SETH MILLIKEN,
Treasurer.

AUDITOR'S CERTIFICATE
(Page 11 of their Report)

We have audited the books and accounts of The New York Academy of Medicine for the year ended December 31, 1934, and hereby certify that the Balance Sheet and Statement of Income and Expense herewith submitted, in our opinion, correctly reflect the financial condition as at December 31, 1934, and the results of operations for the year under review, the accounts being kept on a cash basis.

Respectfully submitted,

MILLER, DONALDSON AND COMPANY.

REPORT OF THE COMMITTEE ON ADMISSION

The Committee on Admission reports to the Academy that during the past year 127 applications for membership were considered. Of these 3 were recommended for Resident Fellowship, 66 for Resident Membership, 3 for Non-resident Membership and 3 for Associates; 23 applicants were dropped.

The Committee met each month except during the summer and reports an attendance of nearly 100 per cent. On December 31, 1934, there were 22 vacancies. There are 21 applicants for Membership, and 1 for Associate now before the Committee.

The Committee seeks the cooperation of the Fellows and Members in asking that they give support to candidates believed to be desirable, and write as fully as possible in regard to them. The Committee also asks that the Members and Fellows exercise greater care in considering whether or not they desire to support a candidate. It has happened on a number of occasions during the past that one or more of the sponsors of an applicant have withdrawn their approval of the candidate, either verbally or in writing, which is always embarrassing to the Committee.

HENRY ALSOP RILEY, *Chairman.*

REPORT OF THE COMMITTEE ON FELLOWSHIP

The Committee on Fellowship has to report the resumption of activities in November 1934 after an interruption due to reconsideration by the Council and Section officers of the procedures involved in the designating of former *Fellows* of the Academy as Fellows in the specified Sections or affiliated societies and in the promotion of present *Members* to such Fellowship.

The changes in Section 6, Article XIII, of the By-Laws, approved by the Committee and forwarded to the Council, will, when adopted, relieve the Committee on Fellowship of all responsibility as to the disposition of *Fellows* of the Academy whose applications for Fellowship were received prior to January 5, 1933.* Such former *Fellows* of the Academy will then be automatically recognized as Fellows in the Section of their choice on receipt of their application by the Academy. The Committee on Fellowship will, therefore, be concerned only with applications for promotion to Fellowship by *Members* of the Academy, and any distinguished medical men who may apply for Fellowship direct.

The Committee has received and approved the revised qualifications considered by each Section as necessary for recommendation for promotion. These have received the final approval of the Council of the Academy. Although these qualifications are not in all cases uniform, the Committee feels that each Section should proceed according to its own rules, as in the end all applications will be subjected to the same scrutiny by the Committee on Fellowship and finally by the Council.

In meeting the proposed changes of the Advisory Committees of the Sections, the Committee on Fellowship has revised its rules of procedure. These rules have received the approval of the Council and are in part as follows:

* Since the writing of this report the recommended changes in the By-laws have been approved by vote of the Fellowship at a Stated Meeting of the Academy held March 7, 1935.

1. The Advisory Committees in arriving at their recommendations shall act under the qualifications as recommended by their Section and approved by the Council.

Each application shall be accompanied by the names of the Directors of service under whom the applicant was trained and, or, with whom he is now associated and information concerning his status as to:

- a. Previous recognition by National Boards.
- b. Advanced Degree by recognized University.
- c. Internship, Assistant Residency, Residency, Attending-ship, or other institutional affiliation.
- d. Contributions to literature.
- e. Teaching activities.
- f. Research activities.
- g. Distinguished service.

2. The Committee on Fellowship shall make recommendations to the Council as to the promotion of the candidate according to their interpretation of the information furnished and in accordance with the sum total of the qualifications submitted by the various sections. They shall be guided by the intent rather than the specific clauses of such section qualifications.

Satisfactory hospital experience shall include training in a general hospital of one year, followed by special internship, assistant residency or residency of one or two years.

Credit for special post-hospital experience shall be given for:

- a. From three to five years' service in out-patient department or on attending staff of a hospital approved by this Committee.

or

- b. Six months full time laboratory experience.

or

- c. At least two publications and presentations.

or

- d. Five years special practice.

or

- e. Regular teaching appointment in chosen specialty.

3. The Committee on Fellowship may require the candidate to take an examination.

4. When a candidate's name and completed credentials are presented to the Committee on Fellowship, if there be three members present knowing him personally and able to speak with authority as to his qualifications, he may be then acted on at once.

The Committee has prepared a satisfactory form of application blank which has also received the approval of the Council.

Proposals of Academy *Members* for advancement as *Fellows* are to be made to the Committee on Fellowship by two Fellows of the section concerned upon the authorized application blank which may be furnished to any Fellow upon request to the Committee on Fellowship. The candidates' credentials when approved by the Committee on Fellowship after consultation with the Section Advisory Committee will then be referred for final action to the Council.

HERBERT B. WILCOX, *Chairman.*

REPORT OF THE COMMITTEE ON LIBRARY

DEATH OF DR. LINSLY R. WILLIAMS

The serious illness of our Director in the autumn of 1933 and death on 8 January, 1934, cast a deep shadow over the Library. The Committee expressed their deep sense of loss in a resolution published in the *Bulletin* for February, 1934. The presence and wise counsel of Dr. Williams is sadly missed at meetings of this Committee. It was characteristic of him that he scarcely ever entered into discussions until the last moment, and then as we expected, in a few words—often in a half humorous way—he summarized previous arguments and gave his own views, which expressed the most expedient and practical way of getting things done. Thus he was perhaps at his best in sketching with broad strokes and with the hand of a master, the outlines of a question that was under consideration and the method by which it should be answered. The Librarian and individual staff members miss his guiding hand. It was not an uncommon thing for the Director to come down to the room of the Librarian, seek comparative quiet, and spend an hour or so asking details of how the Library was getting on or conferring on questions of future policy. Several cigarettes would be consumed, and then he was almost sure to ask for

a large pad of yellow paper and with pencil he would write numbered headings of things that we required to make the Library more complete and useful to the "docs," as he referred to them in a kindly way. He felt that, besides a fine library of modern books, magazines, reports, etc., we should possess the treasures—the classics of medicine—in original editions and it was a joy to him when we procured the Streeter Collection—largely through his efforts and those of Dr. Samuel W. Lambert. He lived long enough to see the completion of the addition to the building containing the beautiful Rare Book and History Rooms for which he had striven. He was rightly proud of the arrangement, design, and decoration of the rooms of the Library and often told the Librarian of the problems involved in obtaining good light for the Periodical and Reading Rooms and in building suitable book-stacks possible of future expansion. He was ready to acknowledge certain little drawbacks in planning but such are inevitable when large projects are concerned. He always looked ahead and wondered how we should house a much enlarged catalogue in days to come. He was delighted with our collections of biographies in the Fellows' Room and the results of our efforts in trying to obtain any sort of book, novel, play, etc., written by doctors, and books written about the medical profession; these are also on the shelves in the same room.

We shall all remember the tall handsome figure of Dr. Williams in an immaculate blue suit as he walked through our halls, observing everything—his elbows bent slightly outwards and his arms swinging free from the shoulder.

ATTENDANCE

There has been a very satisfactory increase in the number of readers; in 1933 there were 45,031 and this year 51,793. It is not at all unusual now for more than 200 to visit the Library in one day, and we can remember the delight we had when 115 or 125 names were registered. As noted on two previous occasions, October showed the greatest number of readers—5,018. March was a close second with 5,014. Large numbers of medical students continue to come and

they constitute the majority of the evening readers. The Library is a public one from nine until five every day but Sundays and holidays. We should like to accede to the requests of many to read after five o'clock, but alas, we cannot, owing to the cost; instead of the large staff present in the day-time, there are only three of its members on duty in the evening, one at the entrance desk, a reference librarian, and a page. A visit to the Library any day between three and five shows that the wants of the crowd of readers can scarcely be attended to.

A LARGER BUDGET

The budget of the Academy, it is perhaps unnecessary to recall, has in recent years been very generous to the Library. When the economic depression came, the Library was asked to bear its share of the reduction in the total expenditure of the Academy. The Library has done so with a very good spirit. It has saved to an extent beyond what may have been necessary. But saving on the part of a great library results in consequences which, it need scarcely be pointed out, may terminate in permanent crippling of its collections. Depressions like the present one do not, in a society like ours, last for ever, so that it may be unnecessary to take too gloomy a view of the future. In these circumstances it is perhaps ill advised to submit ourselves voluntarily to a kind of under-nutrition comparable to the state of rickets. Certain of the nutritional defects may naturally be compensated later but certain of the stigmata which are acquired in the process are likely to persist. In those departments in which no permanent damage is likely, a library, like other sections of the society of which it is one part, should be expected, and may indeed be regarded as eager, to play its part. The Academy is running the same risks, however, to which it has drawn attention in the case of the Army Medical Library; books and journals which should have been bought have not been acquired. It is not true that little has been missed by this policy. These years have seen the publication of books containing notable contributions to scholarship, without the purchase of which this Library should simply not be content.

MISCELLANEOUS

During the course of the year this Committee at its monthly meetings considered a large number of questions, some of which should be briefly touched upon. As is the practice in other libraries, those who order photostats or other reproductions of printed or illustrated matter in our Library have now to sign a form assuming all responsibility for any infringement of copyright that may result. On the recommendation of the Committee to the Trustees an electric polishing machine for our beautiful cork floors has been purchased. Apparatus to make the humidifying system of the Rare Book Rooms more efficient has been installed. The charge for general work done by the Bibliographical Department was raised from one dollar to one dollar and fifty cents per hour, that for typing remains at one dollar. For Library Subscribers, Members, and Fellows the charges are halved and thus reduced to seventy-five and fifty cents respectively.

During the course of a few days all Members and Fellows visiting the Library were asked to express their opinion on the advisability of providing a room in the Library for conversation; the result was fifty-five against, and twenty-five for, such a change. Already there are seats in the elevator hall—for such a purpose and the Reception Room on the ground floor is usually available. It was recommended to the Trustees that the heavy curtains in the Reading and Periodical Rooms be renewed and this has been voted by them. It was recommended that the President of the Academy write to the President of the United States and to Members of Congress seeking aid in procuring funds for the Army Medical Library with which to purchase books and to maintain files of medical magazines, as its budget has been much curtailed. Without the purchase of books future volumes of the *Index Catalogue* will not contain new titles and this truly great bibliographical work will lose much of its usefulness and authority for the medical profession. The letters to the President and members of Congress will be sent early in 1935. A vote of appreciation was tendered Miss Ellen Kerney, A.M., of the Bibliographical

Department on the publication of her book, *A Glossary of French Medical Terms Referable to the Eye* (Publications of the Institute of French Studies, Columbia University, New York, 1934). A resolution of grateful thanks was conveyed by the Committee to the members of the Bibliographical Department for compiling a typewritten index of 98 pages to the transactions of the Academy for the years 1902-1924, a period during which the Academy did not publish its transactions but the papers appeared in various medical periodicals.

Just as this report was being written an unexpected and very generous gift of \$1,000 was received by the Library from the New York Neurological Society for the purchase of works on neurology and psychiatry to fill gaps in our collection. Grateful thanks have been sent by this Committee to the Society. The donation is especially welcome during these years of depression, for our funds for the purchase of books have been almost cut in half and we are falling behind.

It may be remembered that in the autumn of 1933 German publishers promised to reduce the price of their medical and scientific periodicals. We are happy to say that this promise has been kept and further reductions are promised for 1935. At the same time, one should remark that the fall in the value of the dollar has made it very difficult to keep up our subscriptions to these magazines.

SHELF-LISTING

The shelf-listing of our periodicals progressed well this year. It has been sadly put aside for long periods during the last couple of years, owing to the necessity for preparing our entries for the supplements to the *Union List of Serials* and to the *List of Serial Publications of Foreign Governments*. During eight months of 1934, 604 titles were entered on the shelf-list (De - Gi), and at the same time the catalogue-cards for them were revised and occasionally remade. Besides this work, our shelf-lister assists in the Periodicals Department during vacations, registers current

donations, and looks up duplicate-lists offered through the Medical Library Exchange.

MUTILATION OF BOOKS

This occurs in nearly all libraries and we are by no means exempt from the evil doings of vandals, and, of course, unless such persons are caught red-handed the results of their nefarious deeds are discovered by chance alone. Mechanical invention has given to us the safety razor, but, sad to relate, the blade is very efficient for those who wish to steal from books. We have discovered pages neatly extracted from magazines and from valuable *Handbücher*—about forty instances in all this year.

VOLUNTEERS

We are most grateful to the following volunteers who have enabled us to accomplish much work that could otherwise not have been touched, as follows:

Hospital reports: under the direction of Miss Wilson.

Miss Eileen Twomey, 20 hours a week for 8 weeks.

Miss Rosemary Guild, 12 hours a week for 4 weeks.

Miss Sophie Leventhal, 8 hours a week for 4 weeks.

Miss Evelyn Morholt, 5 hours a week for 4 weeks.

Miss Beatrice Margolis, 6 hours a week for 3 weeks.

Mrs. J. T. Gwathmey, 24 hours a week for 12 weeks.

Miss Marchen Thompson, 15 hours a week for 7 weeks.

Miss Jane Aldred, 7 hours a week for 4 weeks.

Miss Twomey deserves special mention for her faithfulness in working every day all summer. She kept the records of all hospital reports received during her stay here, and of our correspondence concerning them, and in addition helped in various other ways.

Mrs. Gwathmey has also been regular in her daily attendance. She has written to all the Canadian hospitals of over 150 beds, and is beginning to circularize the British ones.

Periodicals: under the direction of Miss Wilson.

Miss Lillian Swenson, 30 hours a week for 8 weeks.

Miss Swenson worked as a general assistant, registering mail, shelving periodicals, preparing and receiving books from the bindery, etc. Her daily help was particularly appreciated, as the regular members of the Department were on vacation or busy with extra tasks.

Cataloguing: under the direction of Miss Duvall.

Miss Paula Lance, 6 hours a week for 4 weeks.

Miss Kate Sidoric, 6 hours a week for 4 weeks.

Miss Sara Welcher, 18 hours a week for 1 week.

Miss Marchen Thompson, 15 hours a week for 5 weeks.

Miss Constance Worrall, 7 hours a week for 4 weeks.

Miss Lance and Miss Sidoric copied catalogue cards for theses.

Miss Welcher catalogued portraits in journals and copied cards for the cookery books.

Miss Thompson is beginning to get the cookery books into our main catalogue and on our regular shelves.

Miss Worrall is copying cards for the cookery books.

Picture Collection: under the direction of Miss Lambert.

Miss Martha Lambert, 17 hours a week for 3 $\frac{1}{2}$ weeks.

Miss Mary Mellon, 9 hours a week for 4 weeks.

Miss Beatrice Barry, 17 hours a week for 2 weeks.

Miss Lambert has taken regular and cheerful charge of this collection ever since October, 1930. It is entirely due to her work that it is kept in good order and catalogued up to date.

Reference: under the direction of Mr. Place.

Mr. Henry E. J. McDermott, 20 hours a week for 3 weeks.

Mr. McDermott learned the location of books in the stacks and reading rooms, answered simple reference-questions, and looked up interlibrary-loan requests.

Rare books: under the direction of Miss Annan.

Mrs. Lesta Ford Clay, 17 hours a week for 28 weeks.

Miss Barbara Belmont, 9 hours a week for 4 weeks.

Mrs. Clay catalogued rare books from the Streeter Collection.

Miss Belmont copied cards for the Rare Book Room catalogue.

Indexing Academy minutes.

It has been a source of great pleasure and profit to have with us again Mrs. Laura E. Smith, our good Library Consultant, who has been coming in for a day about twice a month during the fall, to index our earliest Library Committee minutes, and the Trustees' minutes. Much valuable information about the Academy is thus being made available.

In addition to volunteer assistance on hospital reports, we were fortunate in having assigned to us a TERA worker, Miss Mary A. Donohue, who has spent thirty hours a week since June 18, writing for hospital reports in this country, and keeping statistics of the whole report-project.

EXHIBITIONS

During the year several interesting exhibitions were held. Dr. Reginald Burbank arranged one from his unique collection of "Important Books and Amusing Prints on Arthritis," 5 to 29 January. Dr. Robert H. Halsey read an interesting paper before the Historical Section on "Benjamin Waterhouse, Edward Jenner, and Thomas Jefferson" and his exhibition of books, letters, etc., was displayed from 8 March to 10 April. "Ambroise Paré and Sea Monsters," 14 March to 10 April, was arranged by the Secretary of the Historical Section, Dr. Jerome P. Webster. Then Dr. B. B. Crohn and Dr. B. D. Rosenak of Indianapolis, after much historical research, set up an exhibition on the "History of Gastroenterology" during the Graduate Fortnight, 22 October to 2 November. It is intended to publish in the *Bulletin* the list of the books displayed at that time. In addition, an

exhibition of "An Atlas of Vesalian Woodcuts and Books of Vesalius" was also held as mentioned under the heading "Library Publication Fund."

DEPARTMENT OF PORTRAITS AND ILLUSTRATIONS

This Department has acquired over one hundred new pictures: engravings, mezzotints, lithographs, coloured prints and photographs. The collection of Dr. John A. Fordyce, received in 1932, could not be hung in the rooms of the new addition until late in 1933. Their cataloguing and labeling with brass plates was finished this year. Progress is being made in the cataloguing of Dr. Dana's collection, and there are only 1,000 portraits left in this group uncatalogued.

Pictures of doctors are constantly being sent to this Department, as well as many engravings and photographs of medical buildings. Any picture of medical interest is welcome. It is hoped if any one has any, he will give them to us to make this collection a still finer one.

We have a total of 7,300 separate pictures.

PERIODICALS DEPARTMENT *Hospital Reports*

We have been able to carry on the work of building up our file of hospital reports with the help of a full time worker supplied for this purpose by the Works Division of the Emergency Relief Bureau, and several volunteers. We had, in 1932 and 1933, also with volunteer help, sent circular letters to all hospitals in New York City and New York State asking for files of their reports. This year we sent the same letter to hospitals of 150 beds or over throughout the United States and Canada offering the Academy's recent *Annual Reports* in exchange for their reports. We expect to continue this work until we have reports from the leading hospitals of the world. In 1934 we sent 1,030 letters to hospitals in the United States and Canada. These have brought us files of reports from about 200 new institutions, and makes our total of reports currently received 383. At the present time our *Annual Report* goes to 301 institutions in exchange for their reports.

Exchanges

In addition to the regular work of the department in caring for 3,029 serials from about 40 countries, we sent out letters to the publishers of 220 journals which we were not receiving regularly, and most of which are being indexed in the *Quarterly Cumulative Index Medicus*, offering our *Bulletin* in exchange for their publications. The response to these letters has been most gratifying; 85 new exchanges have been established, and back files of their publications have been sent by many of the publishers. Most of these new exchanges are foreign, and many are new journals begun within the last few years. During the year 517 copies of our *Bulletin* went in exchange for 565 publications of other institutions.

HISTORICAL MUSEUM

Our collection in its new quarters has been greatly added to through gifts. The Committee is grateful to two unnamed friends who made it possible to pay Mr. Robert F. McCully, a surgical instrument maker, for two months, and Mr. James S. Sheldon for two and a half months, both of whom classified and arranged our historical collection. The instruments, etc., have been labelled and placed away carefully on shelves behind locked glass doors. These are first and very necessary steps, but we sorely need quite a large number of exhibition cases so that the historical material may be displayed.

DEPARTMENT OF RARE BOOKS AND HISTORY OF MEDICINE

During the first year in which the Department has been established in its new quarters, its usefulness has been apparent. The average number of readers a day is about five, of books consulted, seventeen. In view of the fact that this Department is closed evenings, holidays, Saturday afternoons and Sundays, and considering its specialized and restricted interest, the figures more than justify the Department's existence. Besides routine work, assistance to readers doing research, and aid in compiling historical exhibits, the staff has in the past year catalogued half of

the remaining block of books in the Streeter Collection. In another year this large group of books purchased in 1928 should be completely done.

The Department can boast few startling additions to its collections during the past year. Were we entirely dependent upon our purchases, the list of new accessions would indeed be scanty. Fortunately kind friends have remembered us, so that we can record a number of items of interest.

Gifts

Dr. Margaret Barclay Wilson, one of our Benefactors, does not allow a year to slip by without offering some contribution. From her we received Hippocrates, *Aphorismi*, Glasguae, R. & A. Foulis, 1748; and Garcia de Orta, *Due Libri dell'Historia Semplici . . .* Venice, 1576. It would be impossible for us to hope to have a complete collection of the many printings of Hippocrates, and we are always happy to put another edition on our shelves. Garcia ab Orta, celebrated Portuguese physician, accompanied his patron and patient, Count de Redondo, Vice-Roi des Indes, and returned to his native land an authority on the medicinal plants of the Orient. His published works on the subject proved very popular, and several translations appeared.

Tannequin Guillaumet, a native of Nîmes, was surgeon to Henri IV of France and a prolific writer on medical subjects. He is remembered today more for the large number of his writings rather than for any contribution to medicine. An attractive little book containing several tracts, printed in Lyons in 1611, was the gift of Dr. Alexander Lambert. From Dr. Samuel W. Lambert came a collection of the medical writings of Martin Lister, doctor, traveler and zoologist: *Octo Exercitationes Medicinales*, London, 1697.

Mrs. Alfred Hess, who has been so kind in presenting to us volumes from the Library of the late Dr. Hess, was the donor of Jacobus Sylvius, *Pharmacopoeia*, Lyons, 1552. Sylvius, although the teacher of Andreas Vesalius, was an avaricious bigot, staunchly devoted to Galen and Hippocrates. The Sylvian aqueduct bears his name.

The only addition to our Americana in the past year was an edition of Buchan's popular and often published *Domestic Medicine*, Waterford, 1797, gift of Dr. Frederick Coonley.

The first Englishman to show much skill in surgery was not a doctor, but a layman called John of Arderne. A fifteenth century manuscript of his *De Arte Phisicali et de Cirurgia* rests in the Royal Library at Stockholm, Sweden. A fine reproduction of this was made in 1929, and we are delighted to be the recipient of a copy through the courtesy of the Librarian, Dr. Isaak Collijn.

Our manuscript section was augmented by a number of important gifts. At the death of our good friend, Dr. Frederic S. Dennis, we were given his diaries which he carefully kept from his early boyhood until his death. They contain much of interest to the medical profession. With these are notebooks, and letters which he received from such prominent men as Dr. William H. Welch. To Dr. Robert W. Myles the Library owes deep gratitude for the gift of letters written to him by Sir Morell Mackenzie. Dr. Myles was his assistant at one time, and these letters discussing the case of the Emperor Frederick and Mackenzie's subsequent persecution are of tremendous value in presenting his side of that famous controversy.

The notable additions to our dental collection, given us by the Misses Eliza and Mary Greenwood, descendants of George Washington's dentist, are worthy of a detailed account here, but Dr. Bernhard W. Weinberger has already published a description of these in the November *Bulletin*.

Dr. Joseph L. Miller of West Virginia presented the Library with a Dutch eighteenth century manuscript containing a compilation of prescriptions. The anonymous writer stated he was a grandson of Johan Frederik Helvetius, 1629-1709, Dutch physician. It has been impossible to determine which of Helvetius' many grandchildren he was.

Willard Parker, distinguished New York surgeon, was particularly active in the field of public hygiene and treat-

ment for alcoholism. For many years he was interested in the New York State Inebriate Asylum, and assumed the position of President in 1865. Mrs. Willard Parker, Jr., through Dr. Samuel W. Lambert, gave to the Library a small volume of Dr. Parker's notes in his handwriting concerning the affairs of the Asylum.

In 1798 a young man named Matthias Spalding graduated from Harvard. A few years later he went to England to supplement his medical education, and he studied under Dr. Henry Cline and Sir Astley Paston Cooper. His notes on these courses came to the Library through the kindness of his granddaughter, Miss Rebecca Spalding. Dr. Spalding was made an honorary Fellow of the Academy in 1860.

A recent gift of Dr. Casey A. Wood consisted of five medical olas (palm leaf manuscripts), written about 1700, in gay lacquered wooden covers, modern representations of ancient models. With these were two examples of the stylus used during that period to write on the palm leaves.

Following our request for minutes of medical societies, the Hunterian Society of New York deposited its minutes in the Library.

Purchases

Although our purchases in the last year make a small showing in quantity, there can be no doubt about the quality of the few we have been able to buy. Occasionally in the routine of a library a happy moment comes when it is possible to fill a gap that has been all too obvious for years. We were most fortunate this year to get a little book which is among the rarest of printed medical works: Giovanni Battista Canano, *Musculorum Humani Corporis Pictura Dissectio . . .* possibly printed at Ferrara in 1541. It was to be the first part of a volume of anatomical plates with very brief text, but the later parts never appeared. The copperplates show the bones and muscles of the arm and forearm, from drawings made by Girolamo da Carpi. Canano anticipated Vesalius in a new technique in the portrayal of anatomical subjects.

The publication by the Academy of the Vesalian Atlas has stimulated interest in the sixteenth century pioneer now known as the father of anatomy. It will be remembered that in his time and for years thereafter the clergy looked with horror upon the practice of dissection. We recently added to our shelves a small book entitled, *Medicinae Gloria per Satyras XXII . . .* Munich, 1651. It was written by a member of the Society of Jesus and well known poet, Jakob Balde, 1604-1668. In his twelfth "satyre" he concerns himself with Vesalius and dissection, showing the view of a seventeenth century priest toward that practice.

Cornelius Ploos van Amstel was neither physician nor surgeon, but an artist and engraver. He was responsible for the publication of an exhaustive and useful textbook: *Aanleiding tot te Kennis der Anatomie . . .* Amsterdam, 1783. Choulant says: "The plates are from line drawings, very cleanly engraved faithful sketches from nature. They represent bones, ligaments, and muscles of the trunk and of the extremities, mostly in the style of Albinus." The same illustrations, re-engraved, were used a few years later by Lavater. We are glad to supplement our growing anatomical collection with this apparently scarce item.

GIFT OF DR. HESS' LIBRARY

The Library lost a very generous friend in the death of Dr. Alfred Fabian Hess on 7 December, 1933. He served on this Committee from 1928 to 1932 and during the last year he was Chairman. He was extremely interested in all that concerned the Library and medical library questions in general. This Committee's appreciation of his work with us appeared in the *Bulletin* for January, 1934. Mrs. Hess very generously gave the Library his collection of medical works amounting to 1,252 volumes. All the books now bear a special Academy book-plate, "Ex-libris Alfred Fabian Hess." The volumes that are duplicates of those we possess already are being distributed through the Exchange of the Medical Library Association with the kind consent of Mrs. Hess. Wherever they go they will serve as a reminder of the life and work of a distinguished scientist.

LIBRARY PUBLICATION FUND

By the generous gifts of \$3,000 from Mr. and Mrs. Carl L. Tucker, and of \$1,000 from Mrs. Linsly R. Williams, in memory of her husband, our late Director, this Fund has been substantially increased. Great progress has been made by the Bremer Presse, Munich, with the preparation and printing of our Vesalian Atlas of beautiful anatomical woodcuts made from the original woodblocks of 1543 and 1555, which were brought to light again in the Library of the University of Munich. The Fund created by generous friends of the Academy will be a so-called "revolving" one, that is, on the sale of one publication, the renewed capital, in whole or in part, may be expended on another publication to belong to the "History of Medicine Series published under the Auspices of the Library of the New York Academy of Medicine." We hope that the Fund will revolve in a spiral of ever widening circles! A very considerable amount of work with this Atlas has devolved upon Dr. Samuel W. Lambert, the "god-father" of the Library and upon the Librarian. We wish to express our thanks to Miss Eleanor Sheldon, the Secretary to the Librarian from September, 1933, to September, 1934, for great help in reading the Latin proof of the Atlas. The November meeting of the Historical Section of the Academy was devoted to Vesalius and the Atlas. Papers were read by Dr. Lambert, the Librarian, and by a guest, Mr. William M. Ivins, Jr., Curator of Prints and Engravings at the Metropolitan Museum of Art. The latter's interesting paper, provocative of considerable criticism, revealed much research into the work of Van Calcar, the illustrator of the books of Vesalius, and much study and artistic criticism to determine his position in relation to that of the anatomist. An exhibition of the books of Vesalius and of the woodcuts of the Atlas was set up for this meeting, and it was maintained for several weeks in the Lobby and Reading Room of the Library.

The Library Publication Committee was very glad to grant permission to the Morrill Press of Fulton, N. Y., to reproduce in facsimile the original Franklin letter which

has been a possession of the Library for many years. Dr. E. L. Keyes, F.R.C.S., Eng., contributed critical and historical notes. The beautifully printed brochure, which was published in the summer, bears the title, *A Letter on Catheters written by Benjamin Franklin to his brother John . . . Philadelphia, Dec. 8, 1752.*

STATISTICS FOR 1934

Donations

Publishers who have presented complimentary volumes:

D. Appleton-Century Company	10	Paul B. Hoeber, Inc.	7
F. A. Davis Company	1	Lea & Febiger	16
Dental Items of Interest Publishing Company	1	The Macmillan Company	2
Eugenics Publishing Company	1	Oxford University Press	13
Golden Galleon Press	1	Rational Living Publishers	1
Harper & Brothers	1	W. B. Saunders Company	27
		William Wood & Company	3

Donors of twenty or more volumes:

Dr. S. T. Armstrong	27	Dr. F. P. Reynolds	27
Dr. Helen Baldwin	31	Dr. S. A. Ritter	22
Dr. E. H. Eising	148	Rockefeller Foundation	31
Dr. R. H. Fowler	97	Dr. N. T. Saxl	32
Dr. Malcolm Goodridge	48	Dr. O. M. Schloss	73
Mrs. A. F. Hess	1252	Dr. M. K. Smith	30
Dr. W. B. Hoag	34	Estate of Dr. E. R. Spaulding	109
Dr. T. J. Kirwin	52	Dr. H. N. Stevenson	28
Dr. Percy Klingenstein	64	Dr. Sinclair Tousey	85
Dr. R. Ottolengui	48	Dr. J. A. Vuilleumier	22
Dr. L. V. Paider	35	Dr. H. E. Westbay	27
Dr. H. S. Pascal	63	Dr. M. B. Wilson	92
Dr. L. S. Rau	21	Dr. F. C. Wood	71

Donors of large numbers of unbound journals:

<i>American Journal of Cancer</i>	1469	Dr. E. M. Colie, Jr.	377
<i>Archives of Pediatrics</i>	445	College of Physicians and Surgeons, Columbia University	1188
Dr. S. T. Armstrong	218	Dr. T. E. Elmendorf	208
Dr. L. F. Bishop	286	Fifth Avenue Hospital	1752
Dr. H. M. Bergamini	149	Dr. Henry Fowler	387
Miss Mabel Brown	352	Dr. H. G. Harvitt	382
Dr. W. B. Coley	199		

Dr. Forbes Hawkes	320	Municipal Reference Library	1180
Dr. A. B. Hirsh	449	Dr. R. Ottolengui	497
Dr. W. B. Hoag	227	Dr. H. S. Pascal	320
Dr. William Jacobsohn	253	Rockefeller Foundation	832
Dr. S. E. Jelliffe	372	Rockefeller Institute for Medi-	
Dr. S. J. Kessler	314	cal Research	207
Dr. T. J. Kirwin	266	Martin H. Smith Company	1070
Dr. R. S. Knorr	216	Dr. A. S. Taylor	252
Dr. S. W. Lambert	1132	Dr. Josephine Walter	244
Dr. Raphael Lewy	336	Dr. I. S. Wile	203
Mount Sinai Hospital	2164		

Summary of donations:

Books	3,055
Journals	24,737
Pamphlets	14,199

Total	41,991

Donors of Museum material:

Dr. J. B. Clark	A composite cystoscope used by Dr. F. Tilden Brown.
Dr. Warren Coleman	Ten instruments for cupping
Dr. Frederick Coonley	A saddle-bag used by Dr. Edgar D Coonley in his early days of practice on Staten Island, 1874. A mortar and pestle used during the Revolutionary period by a New Hampshire physician
First District Dental Society	A large number of dental instruments, on permanent loan
Dr. R. G. Freeman	A set of original O'Dwyer intubation instruments
Misses Eliza R. & Mary M. Greenwood	A large number of dental instruments belonging to Dr. John Greenwood, 1760-1819, and to Dr. I. J. Greenwood, 1795-1865; a spinning wheel over two hundred years old made into a dental foot drill by Dr. John Greenwood and used by him and his son, Dr. Isaac Greenwood
Dr. John Horn	A pocket medicine chest, head mirror, two hypodermic instruments and a large number of ear, nose, throat instruments.

Dr. Walter Mendelson .. .	An obstetrical bag, not to be opened until February 12th, 2034. A large number of medical and surgical instruments; a medicine case.
Mr. Davenport Pogue (through Dr. Warren Coleman)	An old medicine chest.
Mr. C. P. Smith .. .	An anesthesia inhaler, date about 1848.
Mrs. Laura E. Smith .. .	A pair of spectacles used by her great-grandfather, William Paulson, Hackensack, N. J., about 1830.
Dr. Sinclair Tousey	A large number of medical instruments, lantern slides, etc.
Dr. S. C. G. Watkins	Old surgical instrument used in removing tonsils, Boston, about 1850.
Dr. Casey Wood	"Sinhalese olas or palm leaf manuscripts on early medicine and how they are made," by Dr. Andreas Nell, Kandy, Ceylon, 1925; five palm-leaf MSS on early medicine; a prepared leaf of the talipot palm for use in writing olas; a long and a short stylus used in writing medical and other olas.

Miscellaneous donations:

Dr. C. F. Bolduan	A picture of Col. E. B. Dalton with his biography.
Dr. R. M. Brickner	Thirteen certificates belonging to Dr. W. M. Brickner.
Dr. Harlow Brooks	Manuscript of six lectures delivered by Capt. James Mitchel, father of Mayor John Purroy Mitchel, in Peru, where he went after escaping from Ireland following a political uprising.
Dr. Reginald Burbank	A framed caricature.
Captain C. S. Butler	A photostat of an old rare work on syphilis by Villabos, 1498.
Dr. D. Cascio	A typescript of an address read before the medical staff of Gouverneur Hospital, October 12th, 1934.
Mr. Paul De Kruif	A cutting, his "Mender of Hearts" (Mackenzie).
Dr. D. B. Delavan	Four letters from Sir Morell Mackenzie, a cutting, "Dr. Mackenzie's Defence," a preliminary notice of the

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| Estate of Dr. F. S. Dennis | sixty-third annual meeting of the British Medical Association, Section M. Laryngology, July 30-Aug. 2, 1895. Diaries, note-books, scrap-books, letters and other memorabilia of Dr. F. S. Dennis. |
| New York Academy of Medicine, Orthopaedic Section, through Dr. G. R. Elliott | Minutes of the New York Orthopaedic Society and minutes of the New York Academy of Medicine, Orthopaedic Section. |
| Dr. Samuel Gitlow | A typewritten translation of an article by Dr. Wilhelm Erich from <i>Studies of Rockefeller Institute of Medical Research</i> , v. 79, 1931. |
| Misses Eliza R. & Mary M. Greenwood | A picture of Dr. John Greenwood, Surgeon-dentist to His Excellency, George Washington. A manuscript book by Dr. Isaac J. Greenwood and three books used by him. |
| Dr. R. H. Halsey | A photostat copy of the diploma issued by the University of Leyden to Benjamin Waterhouse. |
| Mrs. A. F. Hess |A typescript of an article by Mrs. H. R. Benjamin on Dr. Alfred F. Hess' laboratory work. One autographed letter. |
| Dr. W. B. Hoag | Seven pictures and eight portraits |
| Dr. S. E. Jelliffe | Two portraits Portfolio of correspondence relative to the preparation of the Semi-Centennial volume of the American Neurological Association, published in 1924 |
| Dr. S. W. Lambert | A small note-book with notes belonging to Dr. Willard Parker. |
| Dr. Walter Mendelson | Five autographed letters |
| Dr. J. L. Miller | A bound Dutch manuscript. |
| Mr. W. M. Morgan | A diploma of Dr. Moreau Morris A manuscript of Dr. Buck's bills July 19, 1848, to January 5, 1849. |
| Dr. W. B. Mount | Bibliography of Dr. Arthur H. Bill, 1906-1933 |

Dr. R. C. Myles	Clippings about Sir Morell Mackenzie, six letters from him, including a long memorandum, one manuscript by Dr. Robert C. Myles, a letter from the son-in-law of Sir Morell Mackenzie.
Mrs. Willard Parker, Jr.	A manuscript note-book by Dr. Willard Parker.
Dr. H. S. Patterson	A caricature of Pasteur.
Hunterian Society, through Dr. S. M. Peck	Minutes of the Hunterian Society, Jan. 9, 1912-May 11, 1920.
Col. M. A. Reasoner, through Dr. Henry A. Riley	A group of medical pamphlets sewn together.
Dr. Bernard Sachs	One negative photostat of Bowdoin Prize Dissertation, October, 1877, for which Dr. Sachs, then a Harvard Junior, was awarded \$50.00.
Dr. H. M. Silver	Typescript of an obituary of Dr. F. S. Dennis.
Mrs. H. N. Straus	A framed engraving of Dr. Edward Jenner given in memory of Dr. A. F. Hess.
Dr. K. M. Vogel	Sixty-eight pictures, of doctors and medical subjects.
Washington University School of Medicine	Nineteen photostats for the Beaumont Exhibition held in 1933.
Estate of Dr. Linsly R. Williams	A framed photograph of Dr. A. Calmette.
Mr. J. E. Wolff	Diplomas and certificates to practice medicine issued to Dr. H. A. Wolff, one signed by President Krueger, and many other interesting letters and documents.
Dr. E. J. Wynkoop	An old letter dated 1795 and a receipt, 1779.

Donors of money:

Mrs. Stafford McLean, for the Stafford McLean Library Fund	\$3,000.00
Mrs. Lucius Wilmerding, for the Stafford McLean Library Fund	500.00
First District Dental Society	500.00
New York Neurological Society	1,000.00
Mr. and Mrs. Carl Tucker, for the Library Publication Fund . . .	3,000.00
Mrs. Linsly R. Williams, for the Library Publication Fund	1,000.00

Accessions

Books bought	864	
Periodicals bought	1,532	
		Total bought 2,396
Books and periodicals donated by Fellows and Members	591	
" " publishers	228	
" " from other sources	1,469	
Total added		4,684
Withdrawn since 1928		1,943
Total in Library (exclusive of duplicates and unbound material)		192,027
Octavo pamphlets added	877	
" " withdrawn since 1928	449	
" " Total in Library		118,372
Quarto pamphlets added	308	
" " withdrawn since 1928	52	
" " Total in Library		14,772
Folio " added	8	
" " Total in Library		72
Bibliographies added	38	
" " Total in Library		649
Total pamphlets in Library		133,865

Growth of Library's Collection
(exclusive of duplicates and unbound material)

	Additions		Volumes	Pamphlets	Total Collection	Theses
	Volumes	Pamphlets				
1926	5,160	2,854	144,480	100,939		
1927	5,776	3,625	150,256	114,284		
1928	6,009	3,090	156,265	117,374		
1929	7,135	2,637	163,400	120,011		
1930	7,107	5,760	169,906	125,610		
1931	8,009	1,636	177,249	127,892		
1932	5,732	1,526	182,981	130,645		
1933	4,959	1,726	187,660	132,735		60,005
1934	4,684	1,221	192,027	133,865		64,002

*Periodicals Department**Journals:*

	Subscriptions	Exchange or Gratis	Total
1. American	199	422	621
2. Belgian	11	11	22
3. British (except Canadian and Indian)	134	55	189
4. Canadian	6	22	28
5. Chinese	2	3	5

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6. Dutch	16	6	22
7. French	161	43	204
8. German (including Austrian)	292	5	297
9. Indian (Asia)	9	10	19
10. Italian	111	54	165
11. Japanese	5	49	54
12. Portuguese (a) Portugal .	1	7	8
(b) Brazil	2	27	29
13. Russian	9	6	15
14. Scandinavian	34	6	40
15. Spanish (a) Spain	15	26	41
(b) Spanish America	5	63	68
16. Swiss (including League of Nations publications)	9	5	14
17. Miscellaneous (Czech, Finnish, Polish, Hungarian, Rumanian, etc.)	7	58	65
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Total	1,028	878	1,906
 Total in 1933			1,856
Total in 1932			1,934
Total in 1931			1,992

New titles added in 1934	157
Titles current in 1933 of which no 1934 numbers have been received, but not known to have ceased publication (many of these appear only at irregular intervals)	165

Summary:

Journals received regularly	1,906
Journals received irregularly (by donation)	206
Annuals (reports of health departments, catalogues of medical schools, etc.)	424
Hospital reports (annual administrative reports)	383
Documents (weekly, monthly, and quarterly health department bulletins, etc)	110
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Total of serial publications received	3,029

Exchanges:

Bulletin. 517 copies of this go in exchange for 565 publications of other institutions.

Annual Report. This goes to 301 institutions in exchange for their reports.

Theses

	Catalogued	Cards sent to Columbia University
Prior to 1930	14,587	
1930	2,500	5,500
1931	2,367	2,758
1932	3,785	2,240
1933	7,270	4,271
1934	5,328	2,776
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Total	35,837	Total 17,545
Not yet catalogued	28,165	
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Total in Library	64,002	

Disposal of Duplicates

	Receiving libraries, etc.	Bound vols.	Unbound jour.	Theses
1930	90	1,619	9,422	
1931	71	1,446	6,727	
1932	65	2,428	6,262	5,429
1933	78	1,611	3,258	825
1934	90	1,605	10,176	638

Miscellaneous

	1929	1930	1931	1932	1933	1934
Items repaired	8,474	7,093	6,692	7,715	6,842	6,114
Library-cards issued	1,108	1,212	1,376	1,665	1,563	2,777
Library subscriptions (total)	28	30	22	30	25	27
Library subscriptions renewed		16	13	12	17	23
Messenger deliveries for Fellows			312	277	383	283
Messenger deliveries (total)			1,269	1,246	1,121	1,041
Portraits (separate) catalogued					807	1,542
Portraits (in books, etc.) catalogued					3,395	3,577

The Librarian, Mr. Place, and Miss Larsen attended the annual meeting of the Medical Library Association at Baltimore in May and Miss White went to that of the American Library Association in June at Montreal.

ALFRED E. COHN, *Chairman.*

COMMITTEE ON PUBLIC HEALTH RELATIONS

Report of Activities for the Year 1934

The following is a brief account of the activities of the Committee on Public Health Relations for the year 1934.

VITAMIN D MILK

The opinion of the Committee was sought by the Department of Health on the question of the desirability of increasing the availability of fortified milk and the extent to which the Health Department should regulate the production and sale of such milk. In its report, which was published in the August, 1934, issue of the Bulletin of the Academy, the Committee discussed the *raison d'être* of Vitamin D milk; the several methods of producing such milk; the consumption of energized milk; and the need of regulations anent its preparation and sale.

There is no reason, in the opinion of the Committee, why under properly controlled conditions, the addition of Vitamin D to milk by any of the recognized methods should be prohibited. In view, however, of the fact that the methods of production of Vitamin D milk are still experimental and many changes in existing methods may be evolved; that the relative values of units of measurement and the basis for establishing minimum standards for Vitamin D content are still unsettled; and considering the limited availability of laboratory services for making assays, it would seem wiser for the official state and city health authorities to defer the enactment of detailed and specific requirements beyond those necessary to assure the sanitary quality of the ultimate product. For the time being, the producers should be requested to state on the label of each bottle the source of Vitamin D milk; the Health Department to decide what it considers a normal protective dose and in its license provisions demand proof from time to time that the milk produced and sold under the license contains the protective dosage.

STUDY OF THE PSYCHIATRIC DIVISION OF BELLEVUE HOSPITAL

At the request of the Commissioner of Hospitals a detailed study was made of the organization and functioning of the Psychiatric Division of Bellevue Hospital. The study was confined to the general organization of the Division, its plant, equipment and adequacy of professional and other personnel; it did not concern itself with the purely administrative features of the service.

On the strength of the findings of the study the Committee submitted to the Commissioner of Hospitals the following recommendations:

I. The Bellevue Psychiatric Hospital should be completed and equipped in such a manner as to enable it to function properly. Where required, the walls should be painted; appropriate furniture and furnishings, modern and sufficient movable and other equipment should be supplied throughout the building.

II. The present staff should be augmented by additional psychiatrists, psychologists, nurses, social workers and other professional personnel: secretaries, clerks, orderlies, attendants, domestic workers and all types of helpers in sufficient numbers to meet adequately the needs of the Service.

III. The salary schedules for the hospital personnel should be studied and revised with a view of establishing a rate of remuneration sufficient to attract to the Service the highest type of worker in the psychiatric field. When such suitable salary schedule has been put into effect the staff should be employed on a full time basis; this does not apply to the staff of the Out-Patient Department.

IV. Appropriate provision should be made elsewhere than in the Psychiatric Hospital for the care of various types of non-psychiatric patients. Non-psychiatric inebriates now constitute a third or more of the case load; a special study should be made to determine how this problem should be solved.

The same recommendation applies to non-psychiatric prisoners.

Medical and surgical patients who are admitted to the Hospital because of psychiatric complications should be transferred as soon as these complications have disappeared.

V. The service to patients with milder psychiatric disorders in need of hospitalization should be extended to obviate commitments. It should be made possible for such patients to remain, when necessary, for a longer period in the Hospital than is at present feasible.

VI. The utilization of the facilities for a convalescent psychiatric service should be rendered possible.

VII. The service for problem children should be properly established and fostered. Provision of suitable equipment and specialized personnel should be given immediate attention. The inpatient and outpatient facilities of this service should be available to the Pediatric Division of Bellevue Hospital, to the schools, the Children's Court, the social welfare organizations and other child-caring agencies which require guidance in the problems which they encounter.

VIII. The Out-Patient Department should be equipped and staffed with a view of extending its activities and of broadening its capacity to serve the community.

IX. The method of entering data on the hospital records should be improved in order that they may be suitable not only for administrative purposes but also for teaching and research.

X. An adequately staffed psychiatric social service department for both the Out-Patient Department and the Hospital should be established.

XI. The service to the courts should be continued and eventually extended to other boroughs. It should be under the direction of a competent psychiatrist employed on a full

time basis, and assisted by a specialized staff, all of whom should be under the civil service.

A salary schedule should be adopted to attract persons of recognized ability who would be capable of conducting research in addition to the routine duties of the Court Clinic and of making this clinic an outstanding center for the study of criminology. By continuing the service under the Commissioner of Hospitals the work could be coordinated with the anticipated development of the psychiatric divisions of the several municipal hospitals.

The Director of the Psychiatric Service of Bellevue Hospital should be relieved of his present responsibility for the Court Clinic as soon as this can be arranged.

XII. The space reserved for various types of physiotherapy should be utilized through the provision of the necessary equipment and personnel.

XIII. The X-ray Department should be equipped, staffed and utilized as soon as possible.

XIV. The clinical and psychological laboratories should be equipped and staffed.

XV. The kitchen should be supplied with utensils and staff needed to make its utilization possible.

XVI. The facilities for teaching should be placed in condition for use, and a teaching program should be organized, under the supervision of a qualified staff. An opportunity for the training of psychiatrists, psychologists, psychiatric social workers and special nurses should be offered in conjunction with the medical schools affiliated with Bellevue Hospital.

XVII. The Psychiatric Division of Kings County should be administered independently of the corresponding unit of Bellevue Hospital. Provision should likewise be made for the establishment of an independent psychiatric service in the new municipal hospital in the County of Queens.

XVIII. The Director of the Bellevue Psychiatric Service should be relieved of administrative responsibility for the Psychiatric Division at Kings County Hospital and the Children's Hospital at Randall's Island. The whole problem of commitment and care of the feeble-minded should be made a subject for special study.

MEDICAL SERVICE OF THE DEPARTMENT OF EDUCATION

The Committee has made a study of this subject but is not at the present time ready to submit its report.

CARE OF THE CHRONICALLY ILL

Until very recently there existed in this city no well conceived and comprehensive plan for the care of those suffering from long and disabling illnesses, although the medical profession has manifested a keen interest in the treatment of these patients. Out-Patient clinics were established for cardiovascular diseases, chronic arthritis, asthma and allergic conditions, diabetes and other metabolic disorders, hematological diseases and other ailments requiring prolonged medical attention. There is, however, a lack of special hospitals for patients who are not permanently bedridden and require more than custodial care. Aside from Montefiore Hospital, an institution of a very high order, and several other private hospitals, the burden of taking care of the chronically ill has fallen upon three city institutions —the Central Neurological Hospital, the Cancer Institute on Welfare Island, and the Annex of Kings County Hospital in Brooklyn. Not only is this provision altogether too meagre for the need, but the hospitals used for the purpose are obsolete, ill-equipped and otherwise unsuited for the care of the sick.

The Committee on Public Health Relations cooperated with the Committee on Chronic Illness of the Welfare Council in preparing a plan for the guidance of the municipal authorities; it was likewise instrumental in enlisting the interest of the administrative and clinical authorities of our medical schools in the problem.

A scheme has been proposed including different types of care for different types of cases; hospitalization in special modern institutions equipped to provide the necessary treatment for the diverse types of chronic maladies, as well as custodial care of certain types of indigent patients. The coordination of the activities of the social agencies and of the visiting nurses' associations is needed to provide domiciliary care for those of the incapacitated who can be accommodated in their own homes.

The Commissioner of the Department of Hospitals is keenly alive to the problem and has requested the Board of Estimate and Apportionment to build appropriate institutions on Welfare Island. In this request, as well as in his effort to retain title to the land vacated on the Island after the removal of the penal institutions he was vigorously supported by the Committee.

AMBULANCE SERVICE

In connection with the questions raised by the New York State Department of Social Welfare as to the need of State regulations governing ambulance service, the Committee submitted a memorandum advising:

1. That there is no need of state wide regulations in the matter;
2. That the existing law (General Municipal Law, Section 122, Chapter 24 of the Consolidated Laws) which is antiquated and unsound and which is not being enforced should be abrogated;
3. That due to different conditions prevailing in the various cities and localities in this State, rules and regulations governing the ambulance service should be left to local authorities;
4. That regulations governing the appointments of interns should be left to the governing authority of each hospital, and that no state-wide rule or law should be enacted relative to this matter;

5. That no State regulation concerning the length of service in the hospital should be prescribed before an intern is allowed to perform ambulance duty;
6. That the medical boards of hospitals should be impressed with their responsibility for the proper instruction of interns in the duties and responsibilities of ambulance service, and the superintendents of the hospitals should strictly enforce these rules and regulations; and
7. That the municipal regulations governing ambulance service and ambulance equipment should be explicit, and that it should be the duty of the administrative officer of each hospital to supervise their enforcement.

BUDGET OF THE DEPARTMENT OF HEALTH

In the economy program of the new City Administration the budget of the Department of Health for 1934 was scheduled to be cut to the extent of \$687,000. The final decrease amounted to half a million dollars. This reduction necessitated the elimination of such employees and such services as were regarded as not being indispensable to a basic health service to the City. Jointly with the New York Tuberculosis and Health Association, the Committee filed a memorandum with the Mayor and other members of the Board of Estimate and Apportionment, stating that should experience indicate that with the increased efforts of the reduced staff of the Health Department, it will prove impossible to meet the essential needs of the City, the budget allowances for the Department of Health should be increased. The importance of maintaining the financial integrity of the City is fully realized, but concern expressed that the budgetary pruning of the Department of Health shall not be greater than in any other department of the city service. For a number of years past the budget of the Department of Health has been curtailed, and in 1932 the per capita allowance for Health Department activities came down to \$.55 which was much below the corresponding figure in other large American cities. The Committee stressed the view that it regards the curtailment of the

Health Department budget as merely temporary and as giving an opportunity to the Commissioner to demonstrate the effectiveness of his proposed reorganization of the Department staff and functions.

The Committee supported the Health Department requests for an increase in the budget for 1935, which made possible the creation of several new and essential administrative positions and the filling of vacancies in bureau directorships which remained unoccupied for several years. When the Board of Aldermen voted to eliminate the \$85,000 provided for new personnel, the Committee urged the Mayor to veto this action.

The Committee went on record as being opposed to the acceptance of grants from private sources for the payment of salaries of health officials. It expressed the belief that it is entirely proper and within established precedent for a Commissioner to accept grants for the payment of temporary personnel to carry out surveys and educational and experimental work, but all permanent officials should be on the City's salary list.

Concerning the policy in making appointments, the Committee expressed the opinion that in the filling of responsible executive positions, primary consideration should be given to tried efficiency and recognized ability rather than local citizenship, although in every instance an effort should be made to find the properly qualified person by consulting recognized representatives of the local profession.

BUDGET OF THE DEPARTMENT OF HOSPITALS

In order to make possible whole time instead of part time service for the chiefs of such indispensable hospital departments as pathology and radiology, the Commissioner of Hospitals requested small increases in their inadequate salaries. These increases, incorporated in the budget in 1935, were denied by the Board of Aldermen. The Committee urged upon the Mayor to veto this action, pointing

out the importance of these departments to the proper care of the patients and the reasonableness of the increases requested. The Mayor acted accordingly.

HEALTH DEPARTMENT PROBLEMS

The Substitution of Grade B and Evaporated milk for Grade A in Baby Health Stations

In view of the existing economic conditions the question was raised whether the Health Department's practice of recommending exclusively Grade A milk for infants under one year should not be changed and Grade B or evaporated milk be allowed to be substituted therefor. The question was referred to the Section of Pediatrics of the Academy. A special committee was appointed and reported that, though Grade A milk is preferable, Grade B or evaporated milk can be safely recommended, particularly if the former is boiled.

Milk Posters

In response to his request the Committee advised the Health Commissioner to make use of the offer made by the Milk Research Council to print posters for distribution throughout the City, urging a larger consumption of milk. The text of the proposed poster to the effect that: "Milk is necessary to build bone and muscle. No other food of equal value costs so little. Be sure your child gets plenty," was approved by the Committee as suitable.

Acknowledgment of Reports of Communicable Diseases

The Committee advised against the discontinuance of the practice of acknowledging by postal card the receipt of reports of communicable diseases. In the opinion of the Committee the expenditure involved hardly warrants the discontinuance by the Health Department of a practice which has had a stimulating effect on the reporting of cases.

Proposed Health Department Fees

It was proposed that the Health Department be requested to exact fees from various commercial establishments such as markets, beauty parlors, barber shops, and the like. The details of the schedules proposed were studied by the Committee and a number of suggestions made. The Committee, however, expressed itself as being opposed to the entire plan of fees to be charged by the Health Department if this should not be a procedure applicable to all the other City Departments, such for example as Tenement House, Fire and Sanitation. In this connection the suggestion was offered for a change in legislation whereby the fee—or a part of it—for dog licenses should accrue to the City to cover the cost of anti-rabic work.

Labeling of Whiskeys

In a statement to the Commissioner, the Committee advised against diverting the energies of the Health Department from essential activities to matters of such minor health importance as quality of whiskeys. The certification and labeling of whiskeys is a matter which, if attempted, should be done on a wider than merely city basis.

Continuation of Dr. Park's Services as Director of the Health Department Laboratories

In a communication to the Mayor and the Board of Estimate and Apportionment the Committee urged the suspension of the rules concerning the retirement of city employees at the age of seventy, in the case of Dr. Park, whose services to the Department of Health and to the community are invaluable.

Fumigation After Cases of Typhus Fever and Smallpox

In response to an inquiry from the Health Commissioner, the Committee expressed its opinion that the fumigation of premises after cases of typhus fever and smallpox should not be discontinued, for three reasons: (1) there is likelihood that not all of the possible vectors of transmission of

these diseases are definitely known; (2) there is no harm done by fumigation; and (3) the expense involved is negligible.

CONTROL OF THE SALE OF BARBITURIC PREPARATIONS AND OTHER POTENTIALLY HARMFUL DRUGS

The growing evidence that there exists a causal relationship between the increasing number of reported cases of granulocytopenia or agranulocytosis and the increasing use of certain combinations of the barbiturics and amidopyrin suggested an inquiry into the subject. In the report reference was also made to other toxic substances which are freely used for a variety of purposes, such as cinchophen and its derivatives, alpha di-nitrophenol, pyramidon and many other analgesics belonging to the benzene group.

In view of the extensive use by the laity of drugs which are known to be definitely toxic, the Committee expressed the opinion that repeated efforts should be made to inform the public of the dangers associated with the indiscriminate and continuous use of such substances.

A communication was sent to the Health Department urging stricter enforcement of Section 126 of the New York City Sanitary Code. It was suggested that as a first step in this direction the Department of Health should circularize druggists and department stores where these compounds are sold reminding them of the provisions of the Sanitary Code regarding the sale of potentially harmful drugs without a physician's prescription, and pointing out the reasons for the existing regulations.

FREE DISTRIBUTION OF ARSPHENAMINES TO CLINICS

On the question of whether or not the City should supply the dispensaries with arsphenamines for free distribution to patients who cannot pay for the medication, the Committee expressed the following views:

- a. Only such clinics as come up to some reasonable standards of competency should be encouraged to extend their services by a free supply of drugs from the city.

b. For the present the drugs should not be distributed to private practitioners. Such a procedure will, *inter alia*, encourage the undertaking of treatments by physicians who by experience and training are not qualified to engage in the treatment of lues.

c. In view of the difference of opinion that exists among syphilologists as to the type of arsenical compound to be used, it would be inadvisable and impractical on the part of the City to select one preparation and force its use. The Committee therefore suggested that, granting that the money be available, the Health Department should supply only a few of the arsenical compounds, stressing the order of preference as follows:

1. Old Arsphenamine
2. Sulpharsphenamine
3. Neo-arsphenamine, when properly standardized
4. Tryparsamide for the treatment of neuro-syphilites

The Committee further stated that in view of the fact that the administration of syphilis therapy is a procedure requiring special training and competence, and experienced physicians cannot be obtained to do this work unless they receive requisite remuneration, that an appropriation be urged upon the City authorities for the payment of physicians in the syphilis clinics of our municipal hospitals.

DEAFNESS IN SCHOOL CHILDREN

In cooperation with the New York League for the Hard of Hearing, and at the request of the Director of the Bureau of Attendance and of the Director of the Division of Health Education of the Department of Education, the Committee assisted in developing a plan for the otological examination of school children above the third grade and through the junior high school. The Committee regarded this study not merely as the sponsorship of a work project, but as a contribution to the problem of prevention of deafness in school children, as well as of adequate provision of facilities to meet the needs of the children who are already handicapped by defective hearing. In connection with the latter group,

the need for specialized teaching, vocational guidance and life adjustment should be emphasized, and recognition given to the fact that there is at present no adequate provision in the school system for these services. The Committee endorsed the oft repeated recommendations of the League for the Hard of Hearing and the American Federation of Organizations for the Hard of Hearing, to the effect that provision be made for the otologic examination each year of school children not previously examined, and the re-examination of those previously found to have some defect of hearing. It was also recommended that if possible this annual original and re-examination procedure be made a routine by cooperation between the Department of Education and the Department of Health in respect to the medical examination of school children. During the experiment of last year 434,441 children were tested with the 4A audiometer. Of this number 58,188 were found with defects of hearing and 15,530 who had deficient hearing in both ears were recommended for testing with the 2A audiometer. Out of 3,266 children who had otological examinations, 1,778 were found in definite need of lip-reading instruction, and 359 had defects which required follow-up with re-tests and further medical examinations, and the others were in need of observation as possibly in need of instruction in lip-reading.

TONSIL AND ADENOID OPERATIONS

The question raised by the Commissioner of the Department of Hospitals concerning the increasing demands made upon the hospitals for tonsil and adenoid operations received considerable thought and study. As everyone is well aware, the physical examinations of school children have been superficial—in fact, inspections rather than examinations—and the tonsils are a particular target of attack, yielding statistically very good follow-up results. This defect has had the largest percentage of satisfactory termination. In a recent study made by the American Child Health Association, the following interesting findings were recorded with regard to tonsil defects: of the 1,000 children

examined, 61 per cent—or all but 389—had already had their tonsils removed. These 389 cases were examined by a group of school physicians, working in pairs, and 45 per cent were recommended for tonsillectomy. The 215 cases not recommended for operation were seen by a second group of school physicians, who recommended operation in 46 per cent. Finally, the remaining 116 who had been judged as not needing attention by the first two pairs of examiners, were submitted for examination to still a third pair, and 44 per cent of this group were recommended for tonsillectomy. Thus, according to this study, there would have been left only 65 out of 1,000 children eleven years of age, who would not have had a tonsillectomy performed had the recommendations of all of the examining physicians been carried out. The discrepancies in recommendations made by two examiners on the same groups of children, examined at the same time, were striking. In one group one examiner recommended tonsillectomy for 30 per cent, the other for 95 per cent for the same group of children; in another group the proportions were 35 per cent and 88 per cent.

The Committee recommended to the Commissioner that no children referred by the school medical inspectors to the hospitals for tonsil operations be admitted without an adequate history to indicate the ground for the recommended operation. The suggestion was adopted by the Commissioner and appropriate instructions are to be issued by the Health Department authorities.

MATERNAL MORTALITY

Following the publication of the report on Maternal Mortality a meeting was held at the Academy of Medicine under the joint auspices of the Academy, the New York Obstetrical Society and the Medical Society of the County of New York on March 7th. It was devoted to a discussion of the constructive aspects of the Academy of Medicine report. Steps were taken to organize an Obstetrical Council which was subsequently appointed by the Commissioner of Health.

DIET GUIDES FOR DISPENSARY PATIENTS

The Greater New York Dietetic Association submitted to the Committee diets prepared by them for the guidance of dispensary patients. These diets were prepared from the point of view of the medical indications as well as the necessity of economy of purchase. With a few minor changes and suggestions these were approved by the Committee and published in the July and August issues of the *Health Examiner*.

MUNICIPAL CIVIL SERVICE COMMISSION

During the past year examinations were held for the positions of Medical Superintendent in the Department of Hospitals and in the Department of Correction, and for the newly created directorship of health center activities in the Department of Health. As has been the custom in the past, the Commission requested the opinion of the Committee on Public Health Relations concerning the requirements of the candidates and the method of examination, as well as suggestions for suitable persons to act as examiners of the candidates. The specifications laid down for the new position in the Department of Health were not followed by the Commission in every regard.

AUTOPSIES

The Committee has continued to function in cooperation with the New York Pathological Society and the Metropolitan Funeral Directors Association. Many difficulties arising in hospitals have been smoothed out. The Committee received numerous requests from various parts of the country for copies of the poster on the technique of autopsies which was printed last year and distributed to the pathological departments of all the hospitals in the City.

NAMES ON FRIEZE OF BUILDING HOUSING THE DEPARTMENTS OF HEALTH, HOSPITALS AND SANITATION

At the request of the Borough President of Manhattan the Committee selected a list of 29 names to be carved on

the frieze of the building under construction to house the Departments of Health, Hospitals, and Sanitation of the City of New York.

Three of the four faces of the building accommodate seven names each, with space for 6 names on the fourth face and two on a court.

ABUSES OF THE STATE WORKMEN'S COMPENSATION LAW

The Medical Committee on Workmen's Compensation, which was appointed by Governor Lehman, brought to light many abuses in connection with the functioning of the Workmen's Compensation Law. These abuses were divided into two groups: those over which the medical profession has at present no control, and those for which physicians are directly responsible.

In the opinion of the Governor's Committee, the medical profession is not responsible for the hiring of cheap and incompetent medical service by employers and insurance carriers; the competitive practices of hospitals to obtain patients; "lifting" of cases; errors in decisions of lay referees with regard to causal relationship between injury or occupation and the condition for which compensation is claimed; delay in the granting of compensation awards and the disadvantages of the injured workman resulting from the fact that his most important witness—the physician who has treated him—has been selected and paid by the employer or his insurance carrier.

On the other hand the Committee reported that there were instances of inefficient medical treatment, particularly in cases of severe injury requiring the skill of a competent surgeon or specialist; of over-treatment and over-charging; of collusion between the injured workman and physician to prolong the period of compensation; of unduly protracted application of physical therapy; of perfunctory and inadequate medical testimony; and medical advertising to secure patients.

Following the presentation of this report a bill was introduced in the Legislature to amend the Workmen's Compensation Law in accordance with the recommendations of the Governor's Committee.

In the opinion of the Committee on Public Health Relations the so-called Livingston bill offered a constructive and practical method of correcting the existing evils and it so advised the Governor and the leaders of the two legislative chambers.

U. S. EMPLOYEES COMPENSATION ACT IN RELATION TO RELIEF

In January, 1934, the Committee called the attention of the President, as well as the Director of the Budget and the Federal Relief Administrator, to the possibility of a recurrence of claims similar to those under the Veterans' Act for disability and reactivation of diseases among those employed under the Civil Works Administration if they should be regarded as coming under the provisions of the U. S. Employees' Compensation Act.

In the resolution the Committee called attention to the fact that many among those receiving employment under the Civil Works Administration are suffering from impaired health and that under existing conditions the individual physical examination of the applicants was impracticable, and therefore the elimination of semi-invalids impossible.

The Committee urged immediate action which would forestall burdening the federal treasury with innumerable claims for compensation by a legislative provision to the effect that employment under the Civil Works Administration is merely a form of temporary relief and does not bestow upon the recipients of this relief the right to compensation for diseases which may be claimed as having developed or become reactivated during the period of such employment. Some provision to this effect was made in H. R. bill No. 7527, Civil Works program.

FINGERPRINTS

The 4,000,000 records of fingerprints collected by the Federal Division of Investigation of the Department of Justice constitute a valuable asset in the warfare on crime. Recently, instances have come to the notice of police authorities of changed markings on the fingers of criminals brought about by skin grafts and other surgical operations. As a result legislation was proposed in Albany, making it a misdemeanor for a physician or other person to change finger markings. This bill was submitted to the Committee for an opinion. In its report the Committee suggested several changes in the wording of the bill. One of these was the addition of the word "wilfully" in order to except from the provisions of such a measure, surgeons making repairs of deformities caused by disease, accident or congenital malformation. Exception was also taken to the clause "extended skin grafting operation" because such an operation would not necessarily have to be extended or extensive, and furthermore, the whorls and loops in a person's fingers or thumbs may be changed by flaps and a shifting of the skin so as to produce this effect without the actual grafting of skin. The bill as changed by the Committee read as follows:

"Any physician or other person who by operation or otherwise wilfully changes the markings of a finger or thumb of any person so as to affect such person's fingerprints, shall be guilty of a misdemeanor. This provision shall not apply, however, to cases where an operation is necessary to repair a deformity of one or more fingers or thumbs caused by congenital malformation, disease or accident."

MISCELLANEOUS

In addition to activities above described the Committee took interest in the work of the Charter Revision Commission and, as in the past, in legislative matters affecting the public health of the State. Industrial hygiene; the eight hour day for nurses; school ventilation; animal experi-

mentation; attempts by unqualified persons to obtain by legislative fiat the right to treat the sick; prepayment of hospital care; the limitation of the veterans' preference in civil service positions requiring technical knowledge and skill, the attempts to limit appointments to city positions to residents of the city, the need of a comprehensive study of the causes of mortality from appendicitis, treatment of venereal diseases, control of air pollution, the employment of nurses as anesthetists, myopia in school children, the organization of the medical inspection service in our public schools—were problems which claimed to a greater or lesser degree the attention of the Committee during the past year.

JAMES ALEXANDER MILLER,
Chairman.

COMMITTEE ON MEDICAL EDUCATION

The activities of the Committee in the promotion of post-graduate medical study may be summarized as follows:

The Committee has carried on from year to year its survey of postgraduate medical education in New York with a view to improving the value of existing opportunities and to encouraging the development of additional ones. Approval is given to those opportunities which after investigation are found to be well organized with adequate equipment and clinical material and given by physicians of character who are known to be qualified teachers of their special lines of work.

Each year the Committee publishes a "Synopsis of Approved Courses Offered in Greater New York for Post-graduate Study in the Clinical Specialties." It is widely distributed.

The Committee arranges and publishes a list of "Approved Non-Operative Clinics." In the list are included upwards of 150 clinics, held in 33 hospitals of the city.

The "Daily Bulletin," which announces meetings, lectures, conferences and other medical activities of the day,

and the operative work of leading surgeons of the city, has been published regularly for over 20 years. The requirements for the privilege of posting in the Bulletin both as regards hospitals and surgeons have recently been raised.

Bureau of Clinical Information

The Bureau has continued to serve as a clearing house of information in regard to opportunities for postgraduate medical study in this and other countries.

Appointments for visiting physicians to follow the work of leading clinicians of the city are effected by special arrangement with the clinicians concerned.

The Bureau is called upon to answer an increasingly large number of inquiries regarding medical matters of many kinds.

ACADEMY PROGRAMS

Meetings: At the first Stated Meeting of the year the President of the Academy delivered an address on the activities of the past year. This was followed by a scientific program on encephalitis. The scientific program for the first Stated Meeting in February was arranged in cooperation with the Society for Experimental Biology and Medicine and that of April in cooperation with the New York Pathological Society. The March meeting was devoted to a symposium on the problems of cavitation and pulmonary tuberculosis. The Biggs Lecture of the year, on the causes and prevention of blindness, was presented in May. The Carpenter Lecture was incorporated in the program of the Graduate Fortnight. The November meeting was given over to a discussion of the problem of acute appendicitis in New York City. In December the Mayor of the City delivered the 88th Anniversary Discourse. The second Stated Meeting of each month was presented by the Harvey Society.

Lectures: The ninth series of lectures of special interest to the practitioner was arranged to include 20 lectures. The attendance at these lectures has continued to increase

from year to year. The average attendance is now well above 200.

The programs of Stated, Section and special meetings as well as of lectures held under Academy auspices, are announced in the semi-monthly Academy Folder and are made of permanent record in the monthly Bulletin of the Academy.

GRADUATE FORTNIGHT

The subject of "Diseases of the Gastro-Intestinal Tract" was chosen as the general subject for the Seventh Graduate Fortnight. The Fortnight was held October 22 to November 2. As in previous years the features included coordinated afternoon clinics in a group of hospitals, evening meetings at the Academy and an extensive exhibit.

The regular sale of tickets was stopped when the number sold had reached 700. Fellows and Members of the Academy were issued tickets without charge, as were speakers at evening meetings, clinicians and exhibitors, and about one-third of the residents and interns in important city hospitals.

Attendance at evening meetings exceeded that of any previous Graduate Fortnight. For the first week it averaged over 900 and for the second week 840. All afternoon clinics were well attended and some were crowded.

The exhibit was the largest yet held. It occupied the two exhibit rooms, two section rooms, the collation and reception rooms and the main hall on both floors. Especially notable was the exhibit of books illustrative of the history of gastroenterology.

AN OBSERVER OF THIS YEAR'S FORTNIGHT REPORTED AS FOLLOWS:

"Some 180 individuals conducted hospital clinics, ward walks, laboratory demonstrations, exhibitions of new appliances and tests; more than 30 recognized authorities delivered formal evening addresses; there were 14 exhibits

of rare or epoch-making books and incunabula, several unique displays of photographs and curiosa in gastro-intestinal art, 3 embryological and anatomical displays; 9 set-ups concerned with physiology and especially pathology; 7 exhibits dealing with the buccal cavity and the oesophagus; 14 devoted to the stomach and the duodenum; 2 demonstrating lesions of the small intestine (including complete exposition of Crohn and Ginzburg's syndrome, "Regional Ileitis"), 15 of the large intestine, 13 of the liver, bile passages and the pancreas, 15 of general gastro-intestinal tract anomalies, 6 concerned with tumors, 7 on amebiasis and allied conditions (including superb demonstrations by Mackie and Magath—Mayo Clinic—on amebiasis and by Felsen and Osofsky on Sonne dysentery), 5 dealing with the peritoneum, 4 on corrosive poisonings, traumatic lesions and foreign bodies, 3 on newer methods of laboratory diagnosis, 4 demonstrating newer technical procedures, 2 elaborating the significance of statistical data and 5 commercial assemblages of drugs useful in the treatment of alimentary tract ailments: a rather happy idea, since many physicians, although they are well acquainted with the applicability of advertised drugs, usually have very little personal familiarity with the appearance, physical properties, forms or of commercial presentation of such remedies."

"It should not be necessary to add that this Seventh Annual "Post-Graduate Fortnight" of The New York Academy of Medicine was an outstanding success. Its clinical and scientific sessions were crowded with eager-to-learn practitioners; its evening meetings brought capacity audiences; the special exhibits were busy gathering foci each day—places where, leisurely, men might study the new and the instructive groupings of the more or less well-known and where interchange of ideas and opinions meant far more than text-book reading or didactic teaching."

THE ALEXANDER COCHRAN BOWEN SCHOLARSHIP

The Bowen Scholarships provide for one year's clinical study abroad and are awarded to recent graduate interns from New York City hospitals which accept charity patients. The successful candidates of the year were Dr. Ben B. Gelfand of Bellevue Hospital and Dr. Felix H. Vann of New York Hospital.

CONTINUED EDUCATION OF THE PHYSICIAN

The Committee has given much consideration as to ways by which the various opportunities which New York offers for postgraduate medical study may be further developed and coordinated. The question is expected to constitute one of the chief interests of the Committee during the coming year.

MISCELLANEOUS

Classification of Fellows: The Committee in January and again in May reaffirmed the conclusions which were arrived at after several years of study and recommended to the Council that the provisions of the By-Laws of the Academy relating to the classification of Fellows should not be rescinded.

Educational Value of Chronic Cases in Municipal Hospitals: Upon request of the Commissioner of Hospitals the Committee in October undertook a study of the educational value of chronic cases in municipal hospitals, and in November submitted a report.

The Examiner of the Civil Service Commission asked the Committee for an opinion as to what should constitute the qualifications for the position of medico-legal expert to the City Controller. A report prepared by a Subcommittee was approved and forwarded to the Examiner.

List of Approved Foreign Clinicians: The Committee is undertaking to expand and bring up to date its list of approved clinicians practicing in foreign countries.

Lecture Symposia: A proposal to review recent advances in the clinical branches by means of lecture symposia has been under consideration.

HARLOW BROOKS, *Chairman.*

REPORT OF THE COMMITTEE ON SECTIONS

The average attendance at Section meetings during the year and the attendance during the two previous years are shown in the following table:

	1932	1933	1934
Section of Dermatology and Syphilology.....	122	95	106
Section of Surgery	102	137	108
Section of Neurology and Psychiatry.....	280	160	248
Section of Pediatrics	169	164	227
Section of Ophthalmology	275	154	171
Section of Medicine	235	173	142
Section of Genito-Urinary Surgery.....	171	99	111
Section of Orthopedic Surgery.....	199	120	142
Section of Obstetrics and Gynecology.....	227	120	123
Section of Historical and Cultural Medicine.....	67	71	73
Section of Otolaryngology	184	129	168

The Committee on Sections, which is composed of the Chairmen of the Scientific Sections of the Academy with one of the Vice-Presidents as its Chairman, has assisted the Sections and their Advisory Committees in planning programs and in carrying on certain other Section activities.

FRED P. SOLLEY, *Chairman.*

ABRIDGED REPORT OF THE ACTIVITIES OF THE MEDICAL INFORMATION BUREAU

During the calendar year of 1934, the Medical Information Bureau received and handled a total of 3,152 inquiries.

These inquiries varied in nature, from the casual to the highly complicated. Some, like the request of *Collier's Weekly*, for a statement on the progress of medicine during 1934, necessitate extensive correspondence and much work.

NEWSPAPER INQUIRIES

Seven hundred and forty-three inquiries (approximately 22 per cent of the total) were received from newspapers. Practically every newspaper in Greater New York has made use of the Bureau as a source of medical information, for review of medical news items received by them from other sources, for feature material, and for advice on proffered advertisements of a medical or quasi-medical nature.

There was an appreciable increase this year in the number of "feature articles" for which the Medical Information Bureau was called on to supply "raw materials."

There was also a substantial increase in the "checking" of foreign and domestic medical news items of a sensational nature.

ASSOCIATED PRESS ARTICLES

During the year the Bureau issued 313 daily columns to the Associated Press. They were published in approximately four-hundred newspapers throughout the country, serving a reading population of approximately twenty million.

MEDICAL RELEASES

The Medical Information Bureau issued thirty-eight medical releases on important medical subjects throughout the year. Included among these were:

- Presidential Address of the Medical Society of the Co.
of N. Y.
- Social and Medical Impressions of Moscow—Dr. Heyd
- Thomas W. Salmon Memorial Lectures
- Constructive Aspects of the Maternal Mortality Report
- Memorial Meeting for Dr. Williams
- Memorial to Dr. Nellis Foster
- Condition of School Teachers
- Recommendations for Workmen's Compensation
- Myositis Ossificans
- Leukemia
- Dinitrophenol
- Budget Cuts—Dept. of Health
- Artificial Insemination
- Biggs Lectures
- Report on Psychiatric Dept. of Bellevue Hospital
- Flexner Dysentery
- Lumsden cancer cure
- Graduate Fortnight—five releases
- New York City Study on Appendicitis Problem
- Anniversary Discourse

ASSISTANCE TO NATIONAL AND SOCIAL HEALTH ORGANIZATIONS

During the year, the Medical Information Bureau assisted a number of national and local public health organizations in promoting their educational activities. Notable among these were:

- The National Tuberculosis Association
- The American Public Health Association
- The American Nurses Association
- New York Social Work Publicity Council

SOCIAL AND COMMERCIAL ORGANIZATIONS

Seventeen per cent, or four hundred eighty-nine of the total number of inquiries which the Medical Information Bureau received and handled came from social and commercial agencies—

539 or 18% came from individuals
601 or 20% came from doctors
424 or 14% came from miscellaneous sources
332 or 11% came from supervision and radio

The Medical Information Bureau received, throughout the year from the National Better Business Bureau, eleven inquiries.

RADIO

The Medical Information Bureau scheduled and delivered during the year of 1934, three hundred forty-nine radio addresses. These talks were given over the major stations in New York City, twenty-six broadcasts were arranged for the Early Diagnosis Campaign in combatting tuberculosis and thirty-nine during the Seal Sale Campaign. In this we had the cooperation of every tuberculosis agency.

Throughout the year special broadcasts were arranged for the American Society for the Control of Cancer, The American Red Cross, Department of Hospitals, First District Dental Society, First Institute of Podiatry, New York League for the Hard of Hearing, International Migration Service, YMCA, Society for the Instruction in First Aid.

The Medical Information Bureau also arranged a special radio program for the United Hospital Fund in an endeavor to help the United Hospital Fund raise \$500,000 to provide for free care for patients unable to pay for care. This program consisted of a series of six radio addresses dealing with the human and dramatic side of the work of the hospitals. The first address in the series was given by Dr. Moorhead, under the title of "A Day In An Emergency Ward." Other addresses in this series were:

- "The Operating Room," by Dr. Allen O. Whipple.
- "The Conquest of Pain," by Dr. Paluel J. Flagg.
- "Housekeeping in a Hospital," by Mrs. Frank A. Vanderlip.
- "Seeing Through People," by Dr. I. Seth Hirsch.
- "What Is Research," by Dr. Alfred E. Cohn.

ACADEMY RADIO HOUR

During 1934 the Fellows of the Academy presented weekly addresses on timely medical subjects over WABC, which has a network reaching into practically every part of the country.

The Academy received the cooperation of The New York Tuberculosis & Health Association in conducting its radio activities.

ANNUAL PRESS DINNER

In June, the Annual Press Dinner was held at the Academy of Medicine. Dr. Orrin S. Wightman, as in former years, generously served as host.

COOPERATION WITH THE MEDICAL SOCIETY OF THE COUNTY OF NEW YORK

Throughout the year the Medical Information Bureau served the Medical Society of the County of New York in presenting its activities to the press.

The Bureau has continued to receive splendid cooperation from its consultants, of whom there are one hundred and seven, representing thirty-four specialties.

JOHN J. MOORHEAD, *Chairman.*

REPORT OF OFFICES AND MEETINGS AT THE ACADEMY

During the year the following organizations have maintained their offices in the Academy building:

American Otological Society, Inc.

Committee on Religion and Medicine

First District Dental Society

Medical Society of the County of New York

Medical Society of the State of New York

National Committee on Maternal Health, Inc.

New York Physicians Mutual Aid Association

New York Society for the Relief of Widows and Orphans of Medical Men

Society for the Prevention of Asphyxial Death

Meetings have been held in the Academy building by the following organizations:

- American Board of Pediatrics Examiners
- American Hungarian Medical Association
- American Otological Society, Inc.
- American Society of Plastic Surgeons
- American Society of Regional Anesthesia
- American Surgical Association
- American Urological Association, New York Society
- Association of Italian Physicians in America
- Atlantic Dermatological Conference
- Biological Photographic Association, New York Chapter
- Committee on Religion and Medicine
- Cornell Alumni, Committee
- First District Dental Society Exhibit
- First District Dental Society, General and Sections
- German Medical Society
- Harlem Dental Society
- Harlem Medical Association
- Medical Association of the City of Greater New York
- Medical Society of the County of New York, General and Committees
- Medical Society of the State of New York, General and Committees
- Memorial Hospital
- Midtown Dental Society
- National Society for the Advancement of Gastro-Enterology
- New York Academy of Pharmacy
- New York Cardiological Society
- New York Endocrinological Society
- New York Institute of Clinical Oral Pathology
- New York Neurological Society
- New York Physical Therapy Society
- New York Society of Approved Roentgenologists
- New York Society for Clinical Psychiatry
- New York Society of Graduates in Medical Gymnastics and Massage
- New York Society for Thoracic Surgery
- New York Surgical Society
- New York Tuberculosis and Health Association, Committee on Cardiac Clinics
- Pan American Medical Association, New York Chapter
- Physicians Equity Association
- Society of Medical Jurisprudence
- Society for Plastic and Reconstructive Surgery

Society for the Prevention of Asphyxial Death
Society for Psychotherapy and Psychopathology
Society for the Study of Asthma and Allied Conditions
Speedwell Society
Thomas W. Salmon Committee on Psychiatry and Mental Hygiene
Thomas W. Salmon Memorial Lecture
Veterinary Medical Association of New York City
Women's Medical Association of New York City

Accommodations, free of charge, have been granted during the year to:

American College of Surgeons, Fracture Committee
American Dermatological Association
American Society for the Control of Cancer
Biological Photographic Association, Exhibit
Gibbs Prize Fund
Harvey Society
Interne Council Greater New York
Lost Chord League
Manhattan State Hospital, Medical Board of Visitors
Milbank Memorial Fund, Conferences
National Conference on Nomenclature of Diseases
New York Committee on the Study of Hospital Internships and Residencies
New York Pathological Society
New York Physicians Art Exhibit
New York Roentgen Society
New York Society for Experimental Biology and Medicine
New York State Board of Medical Examiners
New York University, Department of Biology
Society for the Prevention of Asphyxial Death

MEMORIAL MEETING

Dr. Linsly Rudd Williams

OBITUARY 1934

FELLOWS

Allen, Thomas H.	Kahn, Morris H.
Brown, James S.	Kilbane, Edward F.
Cleveland, Clement	Lambert, Frederick E.
Coakley, Cornelius G.	Leach, Philip
Davis, Fellowes, Jr.	Leale, Medwin
Dennis, Frederic S.	Lusk, William C.
Donovan, Daniel J.	McAlpin, David Hunter
Doty, Alvah H.	Packard, Maurice
Easton, Charles D.	Phillips, Wendell C.
Ely, Albert H.	Pilgrim, Charles W.
Fishberg, Maurice	Satterthwaite, Thomas E.
Fisher, Edward Dix	Smith, Harmon
Fiske, Edwin Rodney	Spaulding, Edith Rogers
Fitz, George W.	Sturmdorf, Arnold
Fuchsius, John H.	Tieck, Gustav J. E.
Grausman, Philip M.	Urquhart, Howard D.
Highman, Walter J.	Wainwright, Jonathan M.
Huber, Francis	Williams, Linsly Rudd

HONORARY FELLOWS

Curie, Marie Sklodowska	Smith, Theobald
Ramón y Cajal, Santiago	Welch, William Henry

BENEFATOR

Jenkins, Mrs. Helen Hartley

RECAPITULATION

Fellows 36	Honorary Fellows 4
	Benefactor 1

FELLOWS, MEMBERS, ASSOCIATES AND
HONORARY FELLOWS ELECTED
IN 1934

RESIDENT FELLOWS

Goldberg, Maurice	Mecca, Gaetano J.
Grausman, Roland I.	Parsonnet, Aaron E.
Holzman, Jacob E.	Rosenberg, Louis Charles
Hudson, Otho C.	Sacco, Anthony G.
Kaufman, Samuel Maurice	

RESIDENT MEMBERS

Aufrecht, Gustave	Katz, Siegfried Elias
Averbuck, Samuel H.	Kelly, Richard J.
Bakwin, Ruth Morris	Knighton, Willis S.
Barenberg, Louis H.	Lantzounis, Leon
Bonaccutto, Girolamo	Last, Murray A.
Burlingham, Robert	Lewin, Bertram David
Butler, Charles St. John	Loeb, L. Farmer
Calman, Arthur S.	Lorand, Sandor
Cohen, John	Lowrie, Robert J.
Conklin, Reginald	McCauley, John Corran, Jr.
Conway, Francis M.	Machacek, Gerald Frank
Damon, Virgil G.	Malabre, Alfred L.
Daniels, George E.	Marks, Jerome A.
Dargeon, Harold William	Marshall, Edward Ross
de Cholnoky, Tibor	Mayer, Edgar
Denker, Peter G.	Mittell, Edith A.
Farley, Olin Everett	Neal, Phil Hawkins
Fordrung, William J.	O'Regan, John Alfred
Golden, Braham H.	Paton, Richard T.
Goodman, B. A.	Rabin, Coleman B.
Greenberg, Morris	Rice, John L.
Hallock, Halford	Rosenthal, Nathan
Hanlon, Walter Gerard	Rothschild, L. Leonard
Holzapfel, William H.	Rosenwasser, Harry
Janeway, Margaret	Sala, Angelo M.
McAllister	Sallick, Myron A.

Shields, Frances Emily	Traut, Herbert F.
Shuster, Mitchell	Travell, Janet
Silvers, Seymour H.	Tuchman, Lester R.
Stenbuck, Joseph B.	Webster, Bruce
Topper, Anne	Wender, Louis
Toumey, James W., Jr.	Williams, Frederick W.

NON-RESIDENT FELLOWS

Browning, Birt Lee, Newburgh, N. Y.

NON-RESIDENT MEMBERS

Cone, William Vernon, Montreal, Canada
Estes, William L., Jr., Bethlehem, Pa.
Hume, Edgar Erskine, Washington, D. C.
Reynolds, Harry Stephen, Hartford, Conn.
Turnley, William H., Stamford, Conn.
Wall, James H., White Plains, N. Y.

ASSOCIATES

Cannan, Robert Keith, New York.
Harrow, Benjamin, New York.

HONORARY FELLOWS

Howell, William H., Ph.D., Hon. M.D., LL.D., Baltimore.
Krogh, August, Ph.D., Hon. LL.D., Copenhagen.
Novy, Frederick George, Sc.D., M.D., LL.D., Ann Arbor.
Regaud, Claude, M.D., Paris.
Rolleston, Sir Humphry D., Bt., M.D., D.Sc., D.C.L.,
LL.D., Cambridge.

RECAPITULATION

Elected in 1934; Resident Fellows, 9; Resident Members, 63; Non-Resident Fellows, 1; Non-Resident Members, 6; Honorary Fellows, 5; Associates, 2.

COMPLETE ACADEMY MEMBERSHIP

1934

RESIDENT FELLOWS

1913 Abbott, Theodore J.	1924 Andresen, Albert F. R.
1933 Abeloff, Abram Joseph	1923 Andrews, George C.
1901 Abraham, Joseph H.	1933 Andrus, William
1917 Abramowitz, E. Wm.	De Witt
1933 Abramson, Harold	1931 Anopol, George
1933 Ada, Alexander E. W.	1933 Antopol, William
1921 Adair, Frank Earl	1932 Apfelberg, Isidor
1901 Adams, Charles F.	1932 Appelbaum, Emanuel
1905 Adams, Warren S.	1909 Aranow, Harry
1916 Addoms, Lewis P.	1918 Armstrong, Arthur S.
1909 Agatston, Sigmund A.	1924 Armstrong, Donald B.
1907 Albee, Fred H.	1917 Armstrong, Edward
1928 Aldridge, Albert H.	McP.
1905 Alger, Ellice M.	1932 Arnheim, Ernest E.
1920 Allen, Frederick M.	1931 Arnowich, Julius
1931 Allen, Philip Daly	1889 Aronson, Moses
1930 Allen, Theophilus	1913 Asch, Joseph Jefferson
Powell	1919 Aschner, Paul W.
1929 Allison, Benjamin Roy	1900 Ashley, Dexter D.
1933 Allison, Stanton T.	1928 Ashton, Leslie Orrel
1911 Almgren-Dederer,	1933 Astrachan, Girsch D.
Ebba E.	1930 Atchley, Dana W.
1928 Almour, Ralph	1898 Atkinson, James Wm.
1930 Alofsin, Louis M.	1933 Atwood, Edward A.
1921 Altman, Emil	1910 Auchincloss, Hugh
1933 Altman, Harry S.	1912 Auerbach, Julius
1930 Amberson, J. Burns,	1932 Auster, Lionel Sandler
Jr.	1909 Avery, Oswald T.
1915 Ames, Thaddeus H.	1918 Babcock, James W.
1915 Amey, J. Willis	1918 Baehr, George
1932 Amsden, George S.	1916 Bailey, Cameron V.
1918 Amster, J. Lewis	1901 Bainbridge, William
1931 Andersen, Dorothy H.	Seaman
1918 Anderton, Walter P.	1918 Bainton, Joseph H.

1921	Baketel, H. Sheridan	1905	Beling, Christopher C.
1924	Bakwin, Harry	1923	Bell, Alfred Lee
1933	Baldwin, Francis W.		Loomis
1900	Baldwin, Helen	1904	Bell, George H.
1927	Baldwin, Horace S.	1897	Bell, J. Finley
1927	Balensweig, Irving	1925	Bell, Samuel Dennis
1907	Ballin, Milton J.	1918	Beller, Abraham J.
1914	Bancroft, Frederic W.	1930	Bendove, Raphael A.
1914	Bandler, Clarence G.	1928	Benson, Reuel A.
1908	Bang, Richard T.	1926	Benton, Nelson K.
1924	Banowitch, Morris M.	1916	Berens, Conrad
1926	Barach, Alvan LeRoy	1900	Berg, Albert A.
1914	Barber, W. Howard	1927	Berg, Benjamin N.
1930	Barnard, Margaret Witter	1890	Berg, Henry W.
1930	Barnes, William J.	1923	Bergamini, Herbert M.
1908	Barringer, Benjamin S.	1928	Berkowitz, Bernard B.
1908	Barringer, Emily Dunning	1926	Berliner, Milton L.
1924	Barrows, David Nye	1933	Berner, Frank
1913	Barshell, Samuel	1928	Bernheim, Alice R.
1930	Barthel, Else Anna	1924	Bernstein, Max
1909	Bartlett, Frederic H.	1925	Berry, Frank B.
1899	Baruch, Herman B.	1900	Bickham, Warren S.
1913	Bass, Murray H.	1901	Bierhoff, Frederic
1908	Bassler, Anthony	1931	Bierman, William
1914	Bastedo, Walter A.	1895	Biggs, George P.
1919	Bauman, Louis	1928	Biloon, Sol
1920	Beach, Bennett S.	1928	Binger, Carl A. L.
1918	Bebb, Rose Anne	1928	Binkley, George E.
1912	Bechet, Paul E.	1927	Bishop, F. Warner
1921	Beck, Alfred Charles	1893	Bishop, Louis F.
1914	Beck, August Leo	1932	Bishop, Louis F., Jr.
1927	Beck, David	1930	Bishop, Philip George Crosbie
1911	Beekman, Fenwick	1928	Bishop, William H.
1905	Beer, Edwin	1903	Bissell, Dougal
1906	Begg, Colin L.	1915	Black, Florence A.
1932	Beisler, Simon Anthony	1910	Blackwell, Hugh B.
		1932	Blakeslee, George A.
		1924	Blancard, William

1910	Blank, Marcus I.	1908	Braun, Alfred
1932	Blanton, Smiley	1930	Breidenbach, Lester
1919	Blatteis, Simon R.	1917	Brennan, Robert E.
1896	Blodgett, Frank J.	1930	Brennan, Thomas M.
1927	Bloom, David	1918	Brenner, Edward C.
1899	Bloom, Selina	1924	Brennglass, Joachim
1916	Blum, Theodor	1897	Brettauer, Joseph
1927	Blumenthal, J. Leon	1889	Brewer, George E.
1913	Blumgart, Leonard	1930	Brickner, Richard M.
1916	Blumgarten, Aaron S.	1927	Bridges, Milton A.
1921	Boas, Ernst P.	1895	Brien, William M.
1918	Bodenheimer, Milton	1930	Brighton, George Renfrew
1933	Bodo, Richard C.	1912	Brill, Abraham A.
1924	Boehm, Joseph L.	1926	Broadwin, Isra T.
1926	Boenke, Rudolph	1927	Brock, Samuel
1926	Boese, William H.	1904	Brodhead, George L.
1917	Boettiger, Carl	1904	Brooks, Harlow
1925	Bohrer, John V.	1922	Brown, Aaron
1932	Bolduan, Charles Frederick	1912	Brown, Ethel Doty
1916	Bonime, Ellis	*1895	Brown, James Spencer
1907	Bookman, Arthur	1901	Brown, Samuel A.
1918	Bookman, Milton R.	1932	Brown, Wade H.
1920	Boorstein, Samuel W.	1931	Bruce, Gordon M.
1885	Booth, J. Arthur	1918	Bruder, Joseph
1927	Boots, Ralph H.	1920	Brundage, Walter H.
1916	Bortone, Frank	1904	Bryant, William Sohier
1933	Bosworth, David M.	1933	Buchman, Joseph
1915	Bowers, Wesley C.	1929	Buckley, Robert E.
1932	Bowles, Ray McCune	1910	Buckmaster, Clarence W.
1916	Boyd, Carlisle S.	1931	Buckstein, Jacob
1925	Boynton, Perry S.	1909	Buerger, Leo
1932	Bozsan, Eugene John	1910	Bugbee, Henry G.
1907	Bradford, Stella S.	1927	Bull, David C.
1914	Bradshaw, William M.	1928	Bullard, Edward A.
1931	Brandon, William R.	1907	Bullowa, Jesse G. M.
1929	Brandt, Murray Lampel		

*Deceased.

1931	Bullwinkel, Henry G.	1906	Cassebeer, Henry A.
1927	Bunzel, E. Everett	1905	Cassell, James W.
1926	Burbank, Reginald	1910	Caturani, Michele G.
1930	Burchell, Samuel C.	1921	Cave, Henry W.
1910	Burdick, Carl G.	1910	Cecil, Russell L.
1915	Burk, Samuel B.	1908	Chace, Arthur F.
1922	Burlingame, C. C.	1920	Chalmers, Thomas C.
1908	Burrows, Waters F.	1931	Chaney, L. Beverley
1911	Busby, Archibald H.	1886	Chapin, Henry D.
1917	Butler, Eustace C.	1920	Chaplin, Hugh
1920	Butterfield, Paul M.	1904	Chard, Marie Louise
1928	Buvinger, Charles W.	1914	Chargin, Louis
1905	Byard, Dever S.	1924	Charlton, Herbert Richard
1914	Byrne, Joseph	1922	Chase, Herbert C.
1891	Cabot, John	1932	Cheney, Clarence O.
1927	Caffey, John P.	1915	Cherry, Thomas H.
1922	Cahill, George F.	1896	Chetwood, Charles H.
1885	Caillé, Augustus	1926	Chickering, Henry T.
1918	Caldwell, William E.	1924	Chilian, Stephen A.
1932	Calvelli, Eugene	1932	Chobot, Robert
1898	Camac, Charles N. B.	1933	Christensen, Bryant E.
1928	Campbell, Meredith F.	1904	Clark, J. Bayard
1924	Cannon, A. Benson	1922	Clark, Raymond
1928	Carleton, Sprague	*1879	Cleveland, Clement
1921	Carlisle, John H.	1922	Cleveland, Mather
1902	Carlisle, Robert J.	1911	Clock, Ralph O.
1921	Carlucci, Gaston A.	*1894	Coakley, Cornelius G.
1922	Carp, Louis	1931	Coburn, Alvin F.
1921	Carr, Frank C.	1917	Coca, Arthur F.
1886	Carr, Walter Lester	1927	Cohen, Frances
1928	Carrel, Alexis	1924	Cohen, Harry
1933	Carroll, John	1921	Cohen, Ira
1925	Carter, Rupert F.	1905	Cohen, Martin
1904	Carter, William W.	1928	Cohen, Samuel A.
1931	Carty, John Russell	1910	Cohn, Alfred E.
1920	Casamajor, Louis	1890	Cohn, Felix
1915	Cash, Stanmore L.		
1931	Cashman, George A.		

*Deceased.

1926	Cohn, Sidney	1932	Craig, John Dorsey
1910	Cole, Lewis Gregory	1924	Craig, Stuart L.
1909	Cole, Rufus I.	1908	Cramp, Walter C.
1915	Coleman, Joseph	1921	Crampton, C. Ward
1904	Coleman, Warren	1926	Crane, Claude G.
1928	Coler, Eugene S.	1925	Craver, Lloyd F.
1925	Coley, Bradley L.	1910	Crigler, Lewis W.
1892	Coley, William B.	1900	Crispin, Antonio M.
1910	Colic, Edward M., Jr.	1912	Crohn, Burrill B.
1925	Collings, Clyde W.	1921	Cross, Frank B.
1905	Collins, Charles F.	1926	Crump, Armistead C.
1898	Collins, Howard D.	1922	Cudmore, John H.
1892	Collins, Joseph	1901	Culbert, William L.
1927	Colonna, Paul C.	1927	Cumbler, George W.
1922	Colp, Ralph	1921	Cunningham, W. F.
1927	Combes, Frank C., Jr.	1915	Curtin, Thomas H.
1900	Conner, Lewis A.	1923	Cussler, Edward
1927	Connery, Joseph E.	1904	Cutler, Colman W.
1905	Connors, John F.	1923	Cutler, Condict W., Jr.
1908	Cooke, Robert A.	1923	D'Albora, John B.
1927	Cooney, John D.	1886	Dana, Charles L.
1930	Cooper, Henry S. F.	1922	Dannreuther, Walter T.
1927	Cornell, Nelson W.	1922	Danzer, Charles S.
1927	Cornell, Van Alstyne	1931	Danzis, Max
1923	Cornwall, Leon H.	1928	Darlington, Charles G.
1910	Corscaden, James A.	1904	Darlington, Thomas
1898	Corwin, Theodore W.	1908	Darrach, William
1921	Coryell, Clarence C.	1931	Davidoff, Leo M.
1929	Coryllos, Pol N.	1932	Davidson, Harold B.
1927	Cosgrave, Millicent M. A.	1926	Davidson, Leonard T.
1928	Cosgrove, S. A.	1924	Davidson, Louis R.
1933	Co Tui, Frank	1931	Davidson, Morris
1926	Coughlan, James F.	1899	Davis, A. Edward
1922	Courten, Henry C.	1909	Davis, George E.
1925	Cowett, Max P.	1932	Davis, John Staige
1924	Cowles, Henry Clay	1920	Davis, Thomas K.
1931	Cracovener, Arthur J.	1930	Davis, T. Wallis
1922	Craig, C. Burns	1930	Davison, Charles
1927	Craig, Howard Reid		

1933	Dawson, Martin H.	H.
1922	Dean, Archie L., Jr.	
1928	De Bellis, Hannibal	
1933	Deery, Edwin M. G.	
1904	de Forest, Henry P.	
1927	De Graff, Arthur C.	
1924	de Graffenried, Anthony F.	
1928	de La Chapelle, Clarence E.	
1929	Delatour, Beeckman J.	
1880	Delavan, D. Bryson	
1932	Delzell, William Robert	
1890	Dench, Edward B.	
1908	Denenholz, Aaron	
1902	Denig, Rudolf	
1932	Denison, Ward C.	
1932	Denneen, Edward V.	
1927	Dennen, Edward H.	
1908	Dennett, Roger H.	
*1879	Dennis, Frederic S.	
1916	Denno, Willard J.	
1916	Denzer, Bernard S.	
1931	Depping, Charles W.	
1922	DeSanctis, Adolph George G.	
1915	DeSanctis, Nicholas M.	
1917	Detwiller, Albert K.	
1932	deVictoria, Cassius L.	
1926	Devlin, Joseph A.	
1932	deVries, John K.	
1921	deYoanna, Gaetano	
1918	Diamond, Joseph S.	
1891	Dickinson, Robert L.	
1915	Dieffenbach, Richard	
1890	Dillingham, Frederic H.	
1924	Dineen, Paul A.	
1922	di Palma, Salvatore	
1906	Ditman, Norman E.	
1906	Dixon, George S.	
1929	Dochez, Alphonse Raymond	
1922	Dodd, Raymond C.	
1927	Doherty, Wm. Brown	
1885	Dold, William E.	
1921	Donaldson, Blake F.	
1930	Donehue, Francis McG.	
1924	Donnet, John V.	
*1928	Donovan, Daniel J.	
1927	Donovan, Edward J.	
1932	Dooley, Emmett A.	
1920	Doran, William T.	
1888	Dorning, John	
1928	D'Oronzio, Joseph B.	
*1891	Doty, Alvah H.	
1904	Dougherty, Daniel S.	
1905	Douglas, John	
1894	Douglass, H. Beaman	
1923	Dourmashkin, Ralph L.	
1900	Dow, Edmund LeRoy	
1905	Downey, Martin	
1911	Draper, George	
1933	Druss, Joseph G.	
1910	Du Bois, Eugene F.	
1911	Du Bois, Francis E.	
1919	Du Bois, Phebe Lott	
1926	Du Bois, Robert O.	
1917	Dudley, Guilford S.	
1899	Duel, Arthur B.	

*Deceased.

1928	Duff, John	1921	Elwyn, Herman
1927	Duffy, James J.	*1894	Ely, Albert H.
1893	Dunham, Theodore	1904	Emerson, Haven
1915	Dunning, Henry Sage	1930	Emerson, Kendall
1916	Dunning, William M.	1902	Emerson, Linn
1921	Dunnington, John H.	1911	Epstein, Albert A.
1933	Duryee, Abraham Wilbur	1908	Epstein, Sigmund
1923	Dwight, Kirby	1910	Erdman, Seward
1913	Dwyer, James G.	1892	Erdmann, John F.
1927	Dwyer, William A.	1897	Ewing, James
1898	Eagleton, Wells P.	1905	Fahnestock, Ernest
1927	Eastmond, Charles	1931	Falk, Emil A.
*1926	Easton, Charles D.	1916	Falk, Henry C.
1927	Easton, E. R.	1924	Famulener, Lemuel W.
1922	Edelman, Leo	1932	Fanoni, Vincenzo
1922	Edelman, Moses H.	1928	Farnum, Waldo B.
1903	Edgerton, F. Cruger	1909	Farr, Charles E.
1933	Edlin, James S.	1914	Farrar, Lilian K. P.
1921	Edwards, James B.	1910	Farrell, Benjamin P.
1921	Eggers, Carl	1910	Faulkner, E. Ross
1915	Eggleson, Cary	1927	Faulkner, James F.
1922	Eggston, Andrew A.	1904	Feinberg, Israel L.
1931	Eglee, Edward P.	1928	Feit, Hermann
1927	Ehrenclou, Cora M.	1923	Felberbaum, David
1928	Eidson, Joseph P.	1930	Felden, Botho F.
1891	Einhorn, Max	1922	Feldman, Samuel
1924	Eisberg, Harry B.	1922	Felsen, Joseph
1906	Eisenberg, Isidore C.	1907	Ferguson, Robert H.
1904	Eising, Eugene H.	1933	Ferraro, Armando
1933	Eiss, Stanley	1891	Ferris, Albert W.
1906	Eliot, Ellsworth, Jr.	1931	Findley, Robert T.
1925	Eller, Joseph J.	1926	Fineman, Solomon
1921	Elliott, Edward S.	1922	Finke, George W.
1886	Elliott, George R.	1920	Finkelstein, Harry
1921	Elmendorf, Ten Eyck	1931	Finkle, Philip
1897	Elsberg, Charles A.	1913	Finley, Caroline S.
1928	Elser, William	1929	Fischer, Alfred Elias

*Deceased.

1908	Fischer, Hermann	1918	Fraser, John F.
1890	Fischer, Louis	1904	Frauenthal, Herman C.
1928	Fish, George W.	1923	Freed, Frederick C.
1927	Fishberg, Arthur Maurice	1927	Freeland, Frank
1931	Fishberg, Ella H.	1892	Freeman, Rowland G.
*1913	Fishberg, Maurice	1931	Freston, Julian M.
*1886	Fisher, Edward D.	1924	Freudenfall, Benjamin
1918	Fisher, Judson C.	1927	Freund, Meyer H.
1930	Fisher, Robert C., 2nd	1926	Frey, Walter G., Jr.
*1924	Fiske, Edwin Rodney	1886	Fridenberg, Albert H.
1895	Fiske, James Porter	1933	Friedman, Benjamin
1916	Fitzgerald, Fred J. C.	1918	Friedman, Emanuel D.
1920	Fletcher, Norton DeL. L.	1932	Friedman, Jacob
1905	Flexner, Simon	1908	Friedman, Louis
1922	Fobes, Joseph H.	1927	Fries, Margaret E.
1933	Foot, Nathan Chandler	1913	Friesner, Isidore
1899	Foote, Edward M.	1907	Frink, Claude A.
1914	Forbes, Henry Hall	1904	Frissell, Lewis F.
1904	Ford, William M.	1919	Froehlich, Eugene
1932	Fowler, Edmund Prince	1930	Frosch, Herman L.
1919	Fowler, Robert H.	*1912	Fuchsius, John H.
1906	Fowler, Russell S.	1921	Fulkerson, Lynn Lyle
1927	Fowlkes, John W.	1931	Fuller, Clarence C.
1916	Fox, Elsie	1907	Furniss, Henry Dawson
1880	Fox, George H.	1931	Gais, Elmer S.
1904	Fox, Howard	1931	Galdston, Iago
1933	Francis, Charles C.	1932	Galland, Walter I.
1932	Francis, Thomas, Jr.	1900	Gant, Samuel G.
1906	Frank, Robert T.	1916	Garbat, Abraham L.
1913	Frankel, Edward, Jr.	1926	Garlock, John H.
1928	Frantz, Angus M.	1889	Garmany, Jasper J.
1928	Frantz, Virginia K.	1921	Gatewood, William L.
1920	Fraser, Alexander	1914	Gaudiani, Vincent
		1931	Gavin, Helen
		1926	Gay, Frederick P.

*Deceased.

1916	Geiringer, David	1891	Goldenberg, Hermann
1914	Geist, Samuel H.	1928	Goldman, A. Milton
1921	Gelber, Charles N.	1928	Goldman, Charles
1928	Gerber, Rubin A.	1933	Goldman, Irving Brice
1910	Gerster, John C. A.	1933	Goldmark, Carl
1929	Geyelin, H. Rawle	1928	Goldring, William
1901	Gibb, W. Travis	1930	Goldstein, Eli
1930	Giblin, John	1918	Goldstein, Isidore
1893	Gibson, Charles L.	1908	Goldwater, Sigismund S.
1894	Gilfillan, W. Whitehead	1930	Golub, Jacob Joshua
1906	Gillespie, David H. M.	1922	Gonzales, Thomas A.
1921	Gillette, Curtenius	1922	Goodfellow, Lillian M.
1909	Gilmour, Andrew J.	1930	Goodfriend, Milton J.
1925	Ginsberg, George	1913	Goodfriend, Nathan
1930	Ginsburg, Solomon	1906	Goodhart, S. Philip
1931	Ginsburg, Sol W.	1899	Goodman, Abraham L.
1926	Gitlow, Samuel	1903	Goodman, Charles
1918	Glafke, William H.	1931	Goodman, Henry I.
1922	Glazebrook, Francis H.	1924	Goodman, Herman
1923	Globus, Joseph H.	1906	Goodridge, Malcolm
1927	Glushak, Leopold I.	1927	Gordon, Richard E.
1918	Goeller, Charles J.	1922	Gottesman, Julius
1928	Goetchius, Harry D.	1922	Gottlieb, Charles
1933	Goetsch, Arthur	1922	Gottlieb, Mark J.
1922	Goetsch, Emil	1915	Gould, Everett W.
1927	Goff, Byron H.	1923	Grace, Roderick V.
1930	Gold, Harry	1905	Grad, Hermann
1900	Goldan, S. Ormond	1908	Graef, Charles
1934	Goldberg, Maurice	1925	Graham, John C.
1919	Goldberger, Isidore H.	1924	Graham, John R.
1922	Goldberger, Lewis A.	1933	Graham, Thomas Norris
1929	Goldberger, Morris Aaron	1910	Grant, John P.
1927	Goldblatt, David	1889	Grauer, Frank
1931	Goldbloom, A. Allen	*1909	Grausman, Philip M.
1923	Golden, Ross	1934	Grausman, Roland I

*Deceased.

1919	Graves, Gaylord W.	1918	Hall, John Mead
1927	Gray, Irving	1933	Hallock, Leonard A.
1904	Greeff, J. G. William	1891	Hallock, Silas F.
1905	Green, Nathan W.	1904	Halsey, Robert H.
1925	Greenberg, David	1921	Halsted, Harbeck
1928	Greenberger, Monroe E.	1916	Hanford, John Munn
1933	Greene, Carl Hartley	1933	Hanger, Franklin MacCue
1913	Greene, James S.	1928	Hanley, James S.
1926	Greene, Marius	1914	Hansen, Ejnar
1931	Greenhouse, Charles A.	1933	Hanssen, Eilif C.
1933	Greenwald, Harry M.	1928	Hardy, Le Grand H.
1927	Greenwald, Max	1921	Harkavy, Joseph
1932	Gregg, Alan	1904	Harlow, Ellwood
1908	Gregory, Menas S.	1930	Harrington, Helen
1932	Gresser, Edward Bellamy	1931	Harris, Augustus
1933	Grethmann, Wolfgang	1929	Harris, John Huggins
1895	Griffin, Edwin H.	1921	Harris, Louis I.
1931	Grinnell, Robert S.	1894	Harris, Thomas J.
1927	Gross, Louis	1933	Harris, William
1915	Gross, Maurice H.	1904	Hart, T. Stuart
1909	Gross, Moritz	1911	Hartshorn, Winfred M.
1928	Gross, Paul	1917	Hartshorne, Isaac
1918	Grossman, Morris	1932	Hartung, Edward F.
1918	Grushlaw, Israel	1912	Hartwell, Henry A.
1914	Guile, Hubert V.	1901	Hartwell, John A.
1909	Guion, Clarence C.	1931	Harvey, Harold D.
1927	Guion, Connie M.	1897	Harvey, Thomas W.
1929	Gutierrez, Robert	1918	Hasbrouck, James F.
1898	Guttman, John	1925	Haseltine, Sherwin L.
1909	Gwathmey, James T.	1902	Haskin, William H.
1901	Haas, Sidney V.	1922	Hatcher, Robert A.
1909	Haberman, J. Victor	1928	Hauser, Edwin T.
1927	Hahn, Leo J.	1927	Hausman, Louis
1927	Haiman, Julius Arky	1923	Hauswirth, Louis
1925	Hajek, Joseph	1895	Hawkes, Forbes
1904	Hale, Henry Ewing	1922	Hawkins, William H.
1926	Hall, Fairfax	1921	Hawks, Everett M.
		1932	Hayes, James Joseph

1901	Hayes, William Van V.	1927	Hinsie, Leland E.
1907	Haynes, Royal S.	1925	Hinton, J. William
1909	Hays, Harold M.	1913	Hirsch, I. Seth
1926	Healey, William V.	1921	Hirsh, A. Bern
1918	Healy, William P.	1931	Hirst, Virginius B.
1933	Heaton, Claude Edwin	1904	Hitzrot, James M.
1895	Heiman, Henry	1921	Hoch, George F.
1918	Heine, Joseph	1928	Hoenig, Edward
1890	Heitzmann, Louis	1911	Hoguet, Joseph P.
1918	Held, Isidore W.	1909	Holden, Frederick C.
1910	Heller, Isaac M.	1894	Holden, Ward A.
1932	Heller, Nathan B.	1920	Holladay, Edwin W.
1909	Hellman, Alfred M.	1907	Holland, Arthur L.
1926	Henline, Roy Biggs	1925	Hollander, Edward
1933	Hennell, Herman	1930	Holt, Evelyn
1921	Hennessy, James P.	1934	Holzman, Jacob E.
1908	Hensel, Otto	1930	Homrich, Leslie A.
1927	Herendeen, Ralph E.	1921	Honan, William F.
1928	Herman, Harold	1887	Honegger, Oscar P.
1910	Herrick, William W.	1924	Hooker, Henry L.
1922	Herriman, Frank R.	1906	Hooker, Ransom S.
1902	Herrman, Charles	1904	Hopkins, Frank T.
1919	Hertz, Julius J.	1926	Hopkins, J. Gardner
1911	Herzig, Arthur J.	1928	Horn, Herman
1922	Hetrick, Llewellyn E.	1901	Horn, John
1933	Heuer, George J.	1922	Horn, Walter L.
1914	Heyd, Charles Gordon	1913	Horowitz, Philip
1931	Heyl, James Harry	1928	Hory, Joseph S.
1932	Hicks, Hugh M.	1923	Hough, Perry B.
1922	Higgins, William M.	1913	Houghton, Harris A.
*1910	Highman, Walter J.	1930	Howard, Frederick H.
1933	Higinbotham, Norman L.	1925	Howard, Robert C.
1903	Hill, Ira L.	1919	Howe, Hubert S.
1914	Hillman, Oliver S.	1931	Howell, John Taylor, Jr.
1909	Hinkle, Beatrice M.	1926	Hoyt, Harold E.
		1896	Hubbard, William N.
		1901	Hubby, Lester M.

*Deceased.

*1885 Huber, Francis	1924 Irish, William H.
1911 Huber, Frederick W.	1922 Irving, George R.
1923 Hubert, Louis	1913 Irving, Peter
1919 Huddleson, James H.	1909 Isaacs, Harry E.
1934 Hudson, Otho C.	1915 Ives, Robert F.
1919 Huey, Arthur J.	1929 Ivimey, Muriel
1928 Hughes, Wendell L.	1908 Jaches, Leopold
1910 Huhner, Max	1928 Jacobi, Harry G.
1928 Hume, Edward H.	1932 Jacobi, Mendel
1927 Humphreys, Frederick B.	1926 Jacobsohn, Victor J.
	1927 Jacoby, Adolph
1916 Humphries, Robert E.	1885 Jacoby, George W.
1924 Hunt, Charles Jack	1904 Jacoby, J. Ralph
1905 Hunt, Edward L.	1904 Jaeger, Charles H.
1903 Hunt, J. Ramsay	1933 Jaffe, Henry Lewis
1917 Hunt, Westley M.	1910 Jaffin, Abraham E.
1925 Huppert, Elmer I.	1916 James, Henry
1901 Hurd, Lee M.	1928 James, Wm. L.
1924 Hurd, Ralph A.	1930 Janes, Martin Lewis
1933 Hurley, Vincent	1913 Jarcho, Julius
1920 Hutchinson, Abbott T.	1900 Jarecky, Herman
1928 Hutchinson, Robert H., Jr.	1930 Jasper, M. Newton
1928 Hutton, Robert L.	1919 Jeck, Howard S.
1912 Huvelle, Rene H.	1900 Jelliffe, Smith Ely
1918 Hyams, Joseph A.	1914 Jellinghaus, C. Frederic
1928 Hyams, Mortimer N.	1921 Jennings, John E.
1882 Hyde, Frederick E.	1932 Jerskey, Abraham
1910 Hyman, Abraham	1926 Jessup, David S. D.
1924 Hyman, Harold T.	1922 Jessup, Everett C.
1903 Hymanson, Abraham	1922 Joachim, Henry
1927 Hyslop, George H.	1927 Jobling, James W.
1894 Ill, Edward J.	1918 Johnson, F. Elmer
1923 Imboden, Harry M.	1910 Johnson, Frederic M., Jr.
1910 Imperatori, Charles J.	1930 Johnson, Scott
1918 Ingerman, Sergius M.	1924 Johnson, Thomas H.
1908 Ippolito, Gennaro	1933 Johnson, Vansel S.

1918	Jones, David H.	1933	Kereszturi, Camille
1922	Jones, Marvin F.	1899	Kerley, Charles G.
1930	Jones, Oswald R.	1919	Kerley, James H.
1921	Joseph, Morris	1932	Kern, E. Clarence
1927	Joughin, James L.	1913	Kernan, John D., Jr.
1927	Joyner, James C.	1901	Kerrison, Philip D.
1904	Judd, Aspinwall	1922	Keschner, Moses
1922	Judd, Harold B.	1931	Kesten, Beatrice M.
1931	Jungeblut, Claus W.	1931	Kesten, Homer D.
1933	Kahle, Ralph Charles	1915	Key, Ben Witt
1927	Kahn, Isador W.	1898	Keyes, Edward L.
*1918	Kahn, Morris H.	1919	Keyes, Harold B.
1909	Kaliski, David J.	*1912	Kilbane, Edward F.
1917	Kantor, John L.	1933	Kilroe, John Charles
1926	Kaplan, Ira I.	1931	Kimball, Francis N.
1927	Kardiner, Abraham	1920	Kindred, John J.
1930	Karelitz, Samuel	1915	King, James J.
1910	Kast, Ludwig	1920	King, Joseph E. J.
1922	Kaufman, Louis R.	1930	King, S. Edward
1934	Kaufman, Samuel M.	1906	Kingsbury, Jerome
1906	Kaufmann, Jacob	1926	Kirby, Daniel Bartholomew
1928	Keating, John J. H.	1918	Kirby, George H.
1932	Keil, Frank Conrad	1922	Kirwin, Thomas J.
1909	Keller, Frederick C.	1923	Klaus, Henry
1927	Keller, Henry	1932	Kleegman, Sophia J.
1922	Kelley, Catherine Rose	1922	Klein, William
1933	Kelley, Eugene F.	1914	Kleinberg, Samuel
1909	Kellogg, Edward L.	1930	Kleinfeld, Louis
1929	Kellogg, William A.	1928	Klemperer, Paul
1912	Kennedy, Foster	1930	Klenke, Dorothy A.
1926	Kennedy, Robert H.	1923	Klepper, Julius I.
1927	Kennedy, William T.	1926	Klingenstein, Percy
1927	Kenworthy, Marion E.	1933	Klingman, Walter O.
1904	Kenyon, James H.	1927	Klotz, Walter C.
1924	Kenyon, Josephine H.	1897	Knapp, Arnold H.
1905	Keppler, Carl R.	1922	Knapp, Richard E.
		1931	Knauth, Marjorie L.

*Deceased.

1918	Knight, Frank H.	1912	Lamb, Albert R.
1907	Knipe, William H. W.	1910	Lambert, Adrian V. S.
1897	Knopf, S. Adolphus	1893	Lambert, Alexander
1921	Knopf, Saul	*1907	Lambert, Frederick E.
1926	Knox, Leila Charlton	1916	Lambert, Robert A.
1927	Koenig, George A.	1930	Lambert, Robert K.
1931	Koffler, Arnold	1891	Lambert, Samuel W.
1922	Koffler, Emil	1930	Landon, John F.
1924	Kohn, Jerome L.	1918	Landsman, Arthur A.
1927	Kohn, Louis Winfield	1932	Landsteiner, Karl
1898	Koller, Carl	1921	Lange, Louis C.
1906	Kopetzky, Samuel J.	1922	Langmann, Alfred G.
1904	Kosmak, George W.	1918	Langrock, Edwin G.
1911	Kovacs, Richard	1910	Laporte, George L.
1927	Kraetzer, Arthur F.	1897	Lapowski, Boleslaw
1927	Kramer, Benjamin	1931	La Rotunda, Oswald
1927	Kramer, Rudolph	1922	Lasher, Willis W.
1920	Kraus, Walter M.	1922	Lattin, Berton
1930	Krech, Shepard	1930	Lavalle, Peter
1923	Krida, Arthur	1920	Lavell, Thomas E.
1922	Kross, Isidor	1926	La Vigne, Alexander A.
1917	Krug, Ernest F.	1917	Lavinder, Claude H.
1933	Kruna, Richard B.	1908	Law, Frederick M.
1926	Kruskal, Isaac David	1927	Laws, Carl Henry
1932	Kubie, Lawrence S.	1926	Lazarus, Joseph Arthur
1928	Kuhlman, Alvin E.	1932	Leader, Sidney D.
1927	Kurzrock, Julius	1921	Leahy, Sylvester R.
1928	Kurzrok, Raphael	*1908	Leale, Medwin
1930	Kurzweil, Peritz M.	1921	Lederer, Max
1930	Kutisker, Meyer J.	1897	Lederman, Moses D.
1926	Ladd, William Sargent	1928	Lee, George Bolling
1891	Ladin, Louis J.	1930	Leff, Morris
1898	LaFetra, Linnaeus E.	1928	Lehrman, Philip R.
1921	Laidlaw, George F.	1931	Lenz, Maurice
1904	Laighton, Florence M.	1914	Leo, Johanna B.
1931	Lally, Jordan	1910	Leopold, Jerome S.

*Deceased.

1924	L'Episcopo, Joseph B.	1927	Lipsett, Philip J.
1928	Lerner, Charles	1932	Lipsky, Merrill D.
1916	L'Esperance, Elise S.	1933	Lisa, James R.
1926	Lester, Charles Willard	1908	Littell, Elton G.
1932	Levene, Phoebus A.	1924	Littwin, Charles
1905	Levin, Isaac	1933	Livingston, Edward M.
1919	Levin, Oscar L.	1910	Lloyd, Henry W.
1931	Levine, Joseph	1927	Lloyd, Ralph I.
1929	Levine, Morris	1927	Loeb, Martin J.
1927	Levine, Samuel Z.	1929	Loeb, Robert F.
1933	Levy, David M.	1930	Loebel, Robert O.
1927	Levy, Ralph J.	1931	Logie, H. Burton
1922	Levy, Robert L.	1927	Lohman, William H.
1911	Le Wald, Leon T.	1931	Loizeaux, Leon S.
1906	Lewi, Emily	1920	Lombardo, Melchiore
1932	Lewi, Mauricè J.	1906	Long, Eli
1932	Lewis, George M.	1914	Long, William B.
1932	Lewis, Jacques M.	1919	Lopez, Jose Antonio
1927	Lewis, Kenneth M.	1926	Loré, John Marion
1922	Lewis, Raymond W.	1933	Loth, Mathilde
1897	Lewis, Robert	1928	Lough, Walter G.
1908	Lewisohn, Richard	1905	Loughran, Robert L.
1918	Lewy, Raphael	1933	Lowenfish, F. Philip
1900	Libman, Emanuel	1931	Lowrey, Lawson G.
1910	Lieb, Charles C.	1916	Lowsley, Oswald S.
1920	Lieb, Clarence W.	1932	Lubash, Samuel
1924	Lightstone, Abraham	1922	Lucus, Thomas D'Arcy
1927	Likely, David Stanley	1924	Luippold, Eugene John
1933	Lilien, Adolph A.	1927	Luke, H. Clifton
1891	Lilienthal, Howard	*1898	Lusk, William C.
1927	Lincoln, Asa Liggett	1927	Lutz, J. Raymond
1927	Lincoln, Edith M.	1905	Lyle, Henry H. M.
1929	Lincoln, James R.	1908	Lyle, William G.
1918	Lindeman, Howard E.	1929	Lynch, Jerome M.
1917	Linder, William	1898	Lynch, John B.
1926	Lintz, Joseph		
1930	Lippmann, Robert K.		

*Deceased.

1926	Lyon, Edward C., Jr.	1920	McHenry, Junius H.
1933	Lyons, L. Vosburgh	1925	McIntosh, Rustin
1930	Lyons, Morris A.	1908	MacKee, George M.
1922	Lyttle, John D.	1921	McKendree, Charles
*1895	McAlpin, David H.	A.	
1916	McAlpin, Kenneth R.	1920	McKenna, William F.
1901	McAuliffe, George B.	1932	Mackenzie, Locke
1928	McAuliffe, Gervais W.	1927	MacKenzie, Luther
1903	McBarron, John D.	B.	
1918	McCabe, John	1932	McKeown, Hugh S.
1909	McCarthy, Joseph F.	1894	McKernon, James F.
1912	McCastline, William	1927	McKinney, John
	H.		McDowell
1933	McConnell, Robert	1931	McLave, Evan W.
	Hall	1928	MacLean, Aubrey B.
1899	McCoy, John Charles	1930	McLean, William
1905	McCreery, Forbes R.	1911	MacLeod, William P.
1914	McCreery, John A.	1932	McMaster, Philip D.
1904	McCullagh, Samuel	1920	MacNeal, Ward J.
1929	McDaniel, Floyd C.	1917	McNeill, Walter H.,
1921	McDannald, Clyde E.		Jr.
1902	McDonald, Dennis J.	1905	MacPhee, John J.
1930	McDonald, Richard	1908	Macpherson, Duncan
	Joseph	1909	McPherson, Ross
1927	MacFee, William F.	1928	McQuillan, Arthur S.
1927	McGowan, Frank J.,	1924	MacRobert, Russell G.
	Jr.	1920	McSweeney, Edward
1922	McGrath, John F.		S.
1903	McGrath, John J.	1894	Mabbott, J. Milton
1928	McGraw, Robert B.	1930	Mackie, Thomas
1931	MacGregor, J. Arnot		Turlay
1929	McGuinness, Madge	1928	Mage, Sigmund
	C. L.	1923	Magid, Maurice O.
1919	MacGuire, Constantine J., Jr.	1927	Magida, Nathan
1922	MacGuire, Daniel P.	1913	Malcolm, Percy E. D.
1897	MacHale, Ferdinand	1930	Malloch, Archibald
	S.	1920	Maloney, Edward R.
		1914	Mandel, Arthur R.

*Deceased.

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|------|-----------------------------|------|--------------------------------|
| 1928 | Mandelbaum, M.
Joseph | 1916 | Meeker, Harold D. |
| 1892 | Manges, Morris | 1932 | Meeker, Louise H. |
| 1925 | Manheim, Sigmund | 1922 | Meichner, Frederick
H., Jr. |
| 1917 | Manley, Herbert D. | 1900 | Meierhof, Edward L. |
| 1923 | Mann, Hubert | 1927 | Meleney, Frank L. |
| 1897 | Mann, John | 1932 | Mencher, William H. |
| 1927 | Mann, Lewis T. | 1918 | Mencken, Harry P. |
| 1904 | Mannheimer, George | 1931 | Merrill, E. Forrest |
| 1913 | Manning, G.
Randolph | 1924 | Merritt, Katherine K. |
| 1933 | Marcus, Joseph M. | 1902 | Mersereau, William J. |
| 1921 | Marine, David | 1930 | Merwarth, Harold
Russell |
| 1933 | Marino, A. W. Martin | 1929 | Mettenleiter, Michael
W. |
| 1932 | Marmorston, Jessie | 1885 | Meyer, Alfred |
| 1928 | Martin, Alexander T. | 1925 | Meyer, Herbert W. |
| 1928 | Martin, Kirby A. | 1930 | Meyer, Monroe A. |
| 1911 | Martin, Thomas A. | 1931 | Meyer, William Henry |
| 1906 | Martin, Walton | 1907 | Michaelis, Alfred |
| 1930 | Martland, Harrison
S. | 1904 | Michailovsky, M. |
| 1927 | Marton, Louis | 1912 | Michel, Leo L. |
| 1909 | Mason, Howard H. | 1918 | Milbank, Samuel |
| 1927 | Master, Arthur M. | 1927 | Milch, Henry |
| 1931 | Masterson, John J. | 1933 | Milici, Attilio |
| 1904 | Mathews, Francis S. | 1933 | Miller, Charles S. |
| 1927 | Matsner, Eric M. | 1904 | Miller, George N. |
| 1909 | Matthews, Frank C. | 1920 | Miller, Heymen R. |
| 1924 | Matthews, Frederick
J. | 1904 | Miller, James
Alexander |
| 1928 | Matthews, Harvey B. | 1933 | Miller, Julius A. |
| 1886 | May, Charles H. | 1931 | Miller, Laura |
| 1907 | May, William Ropes | 1931 | Millet, John A. P. |
| 1918 | Maybaum, Jacob L. | 1906 | Milliken, Seth M. |
| 1918 | Mayer, Leo | 1901 | Mills, Jackson M. |
| 1933 | Mayer, Max David | 1924 | Mills, Nathaniel |
| 1932 | Maynard, Edwin
Post, Jr. | 1932 | Minsky, Henry |
| 1934 | Mecca, Gaetano J. | 1917 | Mitchell, Charles R. |
| 1929 | Meek, Raymond E. | 1925 | Mitchell, Wendell |
| | | 1910 | Mittendorf, Alfred D. |

1916	Mixsell, Harold R.	1929	Nash, Edward M.
1926	Moench, Gerard L.	1903	Nathan, Philip W.
1922	Moffat, Barclay W.	1921	Neal, Josephine B.
1913	Moffett, Rudolph D.	1923	Neer, Edmonde De Witt
1889	Monaelessier, Adolph	1902	Neer, William
1928	Montgomery, Andrew H.	1902	Neergaard, Arthur E.
1933	Moon-Adams, Dabney	1928	Neff, Lewis K.
1904	Mooney, Henry W.	1931	Neivert, Harry
1909	Moore, Albertus A.	1928	Nelson, Ray S.
1904	Moorhead, John J.	1932	Nemet, Geza
1931	Moretsky, Henry M.	1909	Neuhof, Harold
1927	Morhard, Francis L.	1918	Neustaedter, Marcus
1922	Morrill, Ashley B.	1933	Neustaedter, Theodore
1923	Morris, John H.	1930	Newman, David A.
1890	Morris, Lewis R.	1922	Ney, K. Winfield
1891	Morris, Robert T.	1931	Nicholls, Edith E.
1927	Morrison, William W.	1933	Niles, Henry D.
1925	Morrissey, John H.	1908	Niles, Walter L.
1916	Morrow, Albert S.	1918	Nilsen, Arthur
1930	Morse, Joseph L.	1917	Nilson, S. John
1897	Morton, Henry H.	1906	Norris, Charles
1929	Morton, Paul Colhoun	1928	Northcott, Thomas A.
1906	Moschcowitz, Eli	1932	Northington, Page
1907	Mosenthal, Herman O.	1886	Northrup, William P.
1924	Moss, Abraham	1906	Norton, Nathaniel R.
1908	Moss, L. Howard	1897	Noyes, William B.
1913	Mount, Walter B.	1908	Nutt, John J.
1933	Moyle, Eugene Henry	1912	Oastler, Frank R.
1932	Muehleck, George E.	1918	Oberndorf, Clarence P.
1909	Mulholland, Joseph A.	1931	Oberrender, Girard F.
1927	Murphy, James B.	1930	O'Connor, Francis W.
1922	Murray, Clay Ray	1930	O'Connor, H. A. D.
1929	Murray, Foster	1885	Offenbach, Robert
1924	Myers, Florizel deL.	1904	Ogilvy, Charles
1905	Myers, Howard G.	1932	Olitsky, Peter K.
1925	Myers, Lotta Wright	1933	Opie, Eugene Lindsay
1926	Myerson, Mervin C.	1906	Oppenheimer, Bernard S.
1889	Myles, Robert C.		
1928	Nardiello, Vincent A.		

1912	Oppenheimer, Edgar D.	Harwood
1910	Orgel, David H.	1933 Pearce, Louise
1927	Orgel, Samuel Z.	1926 Pearlstein, Frank
1927	Ornstein, George G.	1913 Pease, Marshall C., Jr.
1928	Orton, Henry B.	1931 Peck, Samuel M.
1932	Orton, Samuel Torrey	1898 Pedersen, James
1904	Osgood, Alfred T.	1904 Pedersen, Victor C.
1908	Osgood, Charles	1895 Peet, Edward W.
1911	Ottenberg, Reuben	1923 Peightal, Thomas C.
1927	Otto, Harold L.	1926 Pennoyer, Grant P.
1908	Oulmann, Ludwig	1928 Perilli, Charles A.
1933	Pack, George Thomas	1928 Perkins, Orman C.
*1909	Packard, Maurice	1929 Perkins, Osborn P.
1906	Page, John R.	1930 Perla, David
1931	Paige, Beryl Holmes	1929 Perlberg, Harry J.
1921	Palefski, Israel O.	1917 Perrone, Ettore
1921	Palmer, Arthur	1931 Peters, Frank H.
1922	Palmer, Walter W.	1905 Peterson, Edward W.
1915	Pappenheimer, Alwin M.	1888 Peterson, Frederick
1923	Pardee, Harold E. B.	1922 Philips, Herman B.
1923	Pardee, Irving H.	*1886 Phillips, Wendell C.
1892	Park, William H.	1922 Phillips, W. Gray
1906	Parker, Ransom J.	1922 Pickhardt, Otto C.
1906	Parodi, Teofilo	1928 Pierce, Lee R.
1908	Parounagian, Mihran B.	1923 Pierson, Richard N.
1934	Parsonnet, Aaron E.	1926 Platt, Anna
1931	Parsons, C. J. F.	1928 Plaut, Alfred
1922	Parsons, William Barclay, Jr.	1920 Poll, Daniel
1911	Pascal, Henry S.	1924 Pollak, Alfred W.
1893	Paton, Stewart	1891 Pollitzer, Sigmund
1904	Patterson, Henry S.	1933 Poltchaninoff, Nicholas J.
1932	Patterson, Howard A.	1928 Pomeranz, Maurice
1927	Patterson, Russel H.	M.
1930	Pattison, Jean	1919 Pond, Erasmus A.
		1904 Pool, Eugene H.
		1931 Pope, Edgar M.

*Deceased.

1931	Potter, Howard W.	1928	Reed, Elias A.
1924	Potter, Philip C.	1928	Reese, Algernon B.
1913	Pou, Robert E.	1914	Rehling, Martin
1931	Pound, Robert E.	1931	Reich, Arthur M.
1931	Pratt, George K.	1930	Reich, Carl
1927	Previtali, Giuseppe	1921	Reid, John J., Jr.
1931	Prewitt, Proviso V.	1924	Reiss, Joseph
1927	Prime, Frederick	1914	Remer, John
1907	Proctor, James W.	1927	Restin, Erich H.
1905	Prout, Thomas P.	1912	Reuben, Mark S.
1933	Pudney, William Kent	1925	Reynolds, Frederick P.
1894	Pulley, William J.	1930	Reynolds, Margaret R.
1902	Putnam, Charles R. L.	1927	Reznikoff, Paul
1932	Pyle, Louis Apgar	1932	Rhoads, Cornelius P.
1921	Quick, Douglas A.	1926	Rhodebeck, Edmund J.
1911	Quimby, A. Judson	1887	Rice, Clarence C.
1891	Quintard, Edward	1921	Rice, Frederick W.
1933	Rabiner, Abraham Max	1904	Richards, John D.
1921	Rabinowitz, Meyer A.	1910	Richards, John H.
1922	Rafsky, Henry A.	1928	Richter, Maurice N.
1927	Rahte, Walter E.	1908	Riesenfeld, Edwin A.
1929	Raisbeck, Milton J.	1909	Rieser, Willy
1931	Ralli, Elaine P.	1932	Riley, Edward J.
1918	Ramirez, Maximilian A.	1919	Riley, Henry Alsop
1916	Ramsdell, Edwin G.	1919	Rimer, Edward S.
1924	Randall, John A.	1917	Ringer, Adolph I.
1925	Randel, William A.	1932	Ringer, Michael
1909	Randolph, John M.	1932	Riordan, Timothy J.
1926	Ransohoff, Nicholas S.	1922	Ritter, Henry H.
1932	Rappleye, Willard C.	1925	Ritter, J. Sidney
1927	Rashbaum, Maurice	1926	Ritter, Saul A.
1920	Rathbun, Nathaniel P.	1931	Rivers, Thomas M.
1925	Ratner, Bret	1924	Robbin, Lewis
1918	Ratnoff, Hyman L.	1907	Robbins, Felicia A.
1931	Ratnoff, Nathan O.	1919	Roberts, Dudley De V.
1914	Rawls, Reginald McC.	1928	Roberts, Kingsley
1926	Read, J. Sturdivant	1910	Roberts, Percy W.
1901	Rector, Joseph M.		

1923	Robertson, Victor A.	1923	Rubin, Isidor C.
1923	Robins, Bernard L.	1921	Rulison, Ray H.
1927	Robinson, G. Allen	1931	Russell, Frederick F.
1929	Robinson, G. Canby	1908	Russell, James I.
1912	Robinson, John A.	1922	Russell, Thomas Hendrick
1928	Robinson, Lewis B.	1933	Ryan, Charles Diller
1910	Robinson, Meyer R.	1909	Ryder, George H.
1910	Robinson, William J.	1930	Sabin, Florence R.
1927	Rodgers, Mortimer William	1934	Sacco, Anthony G.
1920	Roemer, Jacob	1887	Sachs, Bernard
1927	Rogatz, Julian L.	1930	Sackett, Nelson B.
1905	Rogers, John	1927	Sagal, Zachary
1919	Rohde, Max S.	1933	St. George, Armin
1927	Rohdenburg, G. L.	1915	St. John, Fordyce B.
1915	Rongy, Abraham J.	1920	St. Lawrence, William P.
1908	Roper, Joseph C.	1925	Salzer, Benjamin
1928	Rose, Ben-Henry	1918	Sammis, Jesse F.
1916	Rosen, Isadore	1913	Samuels, Bernard
1928	Rosen, Samuel	1927	Samuels, Saul S.
1934	Rosenberg, Louis Charles	1923	Sanders, Theodore M.
1911	Rosenbluth, Benjamin	1921	Sands, Irving J.
1922	Rosenblüth, Milton B.	1933	Sanman, Louis F.
1927	Rosenfeld, Samuel S.	1918	Satenstein, David L.
1923	Rosenheck, Charles	1927	Satterlee, Henry S.
1922	Rosensohn, Meyer	*1882	Satterthwaite, Thomas E.
1928	Rosenson, William	1930	Saunders, Edward W.
1906	Rosenthal, Max	1927	Saunders, Harry Clayton
1933	Rosenthal, Theodore	1919	Saunders, Truman L.
1922	Rosett, Joshua	1920	Sautter, Carl Marion
1928	Ross, John	1915	Savini, Carlo
1919	Rostenberg, Adolph	1933	Savitsky, Nathan
1906	Roth, Henry	1926	Sawhill, John E.
1932	Roth, Irving R.	1932	Sawyer, Wilbur A.
1922	Rothschild, Marcus A.	1927	Saxl, Newton T.
1930	Rous, Peyton		
1912	Rowland, Harry H.		

*Deceased.

1918	Scadron, Samuel J.	1904	Semken, George H.
1918	Seal, J. Coleman	1931	Senger, Fedor L.
1933	Scarff, John Edwin	1911	Senior, Harold D.
1911	Schapira, Samuel W.	1931	Severance, Robert
1927	Scheer, Henry M.	1932	Seward, Jackson A.
1917	Scheer, Max	1924	Seymour, Nan Gilbert
1927	Schick, Bela	1921	Shailer, Sumner
1931	Schilder, Paul F.	1926	Shann, Herman
1923	Schiller, Abraham N.	1921	Shapiro, Louis G.
1903	Schley, Winfield S.	1926	Shapiro, Louis L.
1908	Schlichter, Charles H.	1929	Shapiro, Matthew
1918	Schlivek, Kaufman	1926	Sharlit, Herman
1911	Schloss, Oscar M.	1902	Sharp, J. Clarence
1932	Schmidt, Otto V. M.	1914	Sharpe, William
1908	Schnepel, George A.	1920	Shattuck, Howard F.
1912	Schoenberg, Mark J.	1905	Shearer, Leander H.
1930	Schreiber, Martin	1918	Sheehan, J. Eastman
1918	Schroeder, Louis C.	1907	Sheffield, Herman B.
1930	Schroeder, William, Jr.	1931	Sheldon, Paul B.
1928	Schullinger, Rudolph N.	1929	Shelley, Harold John
1920	Schulman, Maximilian	1932	Sheplar, Adele E.
1912	Schultze, Ernest C.	1909	Sherman, Elbert S.
1927	Schwartz, C. Wadsworth	1920	Sherwin, Carl Paxson
1915	Schwartz, Hans J.	1910	Shine, Francis W.
1928	Schwartz, Irving	1933	Shoenfeld, Dudley D.
1929	Schwartz, Joseph	1931	Shore, Benjamin R.
1928	Schwartz, Sidney P.	1928	Shwartzman, Gregory
1906	Schwarz, Herman	1928	Silbert, Samuel
1917	Schwerdtfeger, Otto M.	1932	Silver, Henry
1922	Scott, Augusta	1880	Silver, Henry Mann
1907	Scott, George Dow	1893	Silver, Lewis Mann
1925	Scott, James R.	1928	Simons, Irving
1933	Selby, Nathaniel E.	1933	Sims, Charles Franklyn
1932	Selig, Seth	1921	Siris, Irwin E.
1922	Selinger, Jerome	1912	Sittenfield, Maurice J.
1931	Selinsky, Herman	1933	Skeel, Henry Robertson
		1921	Skinner, Clarence E.
		1922	Slattery, George N.

1932	Sloan, Lawrence Wells	1917	Spaulding, Harry Van N.
1932	Slocum, C. Jonathan	1928	Speiser, Mortimer D.
1932	Smetana, Hans	1918	Spencer, Henry J.
1923	Smith, Alan DeForest	1910	Spickers, William
1928	Smith, Beverly C.	1920	Spiegel, Leo
1917	Smith, Charles A.	1923	Spielberg, William
1914	Smith, Charles Hendee	1922	Spies, Edward A.
1916	Smith, Clarence H.	1927	Spillman, Ramsay
1930	Smith, Frank R.	1901	Squier, J. Bentley
*1901	Smith, Harmon	1931	Stainsby, Wendell J.
1918	Smith, J. Morrisett	1932	Stanley-Brown, Margaret
1924	Smith, James W.	1922	Stark, Jesse B.
1919	Smith, Martin DeF.	1889	Stearns, Henry S.
1927	Smith, Morley T.	1880	Stedman, Thomas L.
1916	Smith, Morris K.	1904	Steese, Edwin S.
1923	Sneed, William L.	1922	Steffen, Walter C. A.
1918	Snow, William F.	1908	Stein, Arthur
1923	Snyder, Orlow C.	1932	Stein, Herbert Edward
1913	Snyder, R. Garfield	1909	Stein, Sydney A.
1933	Sobel, Irwin P.	1918	Steinach, William
1904	Solley, Fred P.	1928	Steinbugler, Wm. F. C.
1927	Solley, Frederick W.	1925	Steiner, Joseph M.
1905	Solley, John B., Jr.	1928	Stenson, Walter T.
1933	Solley, Robert Folger	1924	Stephens, Richmond
1928	Solomon, Harry A.	1925	Stepita, C. Travers
1893	Sondern, Frederic E.	1905	Stern, Abram Richard
1925	Sonnenschein, Harry D.	1917	Stern, Adolph
1910	Soresi, Angelo L.	1908	Stern, Arthur
1902	Sour, Bernard	1928	Stetson, Dudley D.
1894	Southworth, Thomas S.	1919	Stetson, Rufus E.
1922	Sovak, Francis W.	1907	Stetten, De Witt
1927	Spain, Will Cook	1909	Stevens, Alex. Raymond
*1921	Spaulding, Edith Rogers	1919	Stevens, Charles W.

*Deceased.

1916	Stevenson, George	A.
1922	Stevenson, Holland N.	1909 Sutherland, Fred B.
1927	Stevenson, Lewis D.	1927 Sutton, John E., Jr.
1930	Stewart, Harold J.	1927 Sutton, Lucy Porter
1918	Stewart, John D.	1927 Sweet, Joshua E.
1912	Stewart, William H.	1927 Swift, Harry P.
1911	Stillman, Alfred, 2d.	1916 Swift, Homer F.
1923	Stillman, Edgar	1928 Swift, Walker E.
1918	Stillman, Ernest G.	1926 Symmers, Douglas
1911	Stillman, Ralph G.	1901 Synnott, Martin J.
1931	Stimson, Barbara B.	1904 Taylor, Alfred S.
1921	Stimson, Philip M.	1922 Taylor, Charles G.
1922	Stivelman, Barnet P.	1901 Taylor, Fielding L.
1913	Stockard, Charles R.	1927 Taylor, Henry Keller
1933	Stoloff, E. Gordon	1898 Taylor, Howard C.
1927	Stone, William Ridgely	1930 Taylor, Howard C., Jr.
1930	Stoner, William H.	1933 Taylor, John Arthur
1920	Stookey, Byron P.	1920 Taylor, Kenneth
1924	Stout, Arthur Purdy	1932 Tenenbaum, Joseph
1919	Stowell, David D.	1925 Tenney, Charles F.
1904	Strang, Walter W.	1927 Terry, Arthur H., Jr.
1908	Strauss, Israel	1932 Tetelman, Michael M.
1930	Strauss, Spencer Goldsmith	1911 Thacher, Henry C.
1928	Strodl, George T.	1910 Theobald, Carl
1917	Strong, Samuel M.	1890 Thomas, Allen M.
1887	Stubenbord, William	1924 Thomas, Joseph S.
1930	Studdiford, William E., Jr.	1904 Thomas, William S.
1908	Sturges, Leigh F.	1926 Thomasson, Aaron Hood
*1901	Sturmdorf, Arnold	1927 Thomen, August A.
1927	Sturtevant, James M.	1929 Thompson, Charles Baker
1919	Sturtevant, Mills	1929 Thompson, Samuel Alcott
1912	Sullivan, Raymond P.	1933 Thompson, William P.
1931	Sulzberger, Marion B.	1907 Thomson, John J.
1933	Summerill, Frederick	1927 Thorburn, Grant
1933	Sutherland, Francis	1908 Thorne, Victor C.

*Decesased.

1922	Thornley, Josiah P.	1890	Tyson, Henry H.
1916	Throne, Binford	1933	Ulmar, David
1931	Tickle, Thomas G.	1917	Unger, Arthur S.
1933	Tiebout, Harry Morgan	1924	Unger, James Samuel
*1910	Tieck, Gustav J. E.	1927	Unger, Lester J.
1915	Tilney, Frederick	*1920	Urquhart, Howard D.
1901	Tilton, Benjamin T.	1912	Valentine, Julius J.
1906	Timme, Walter	1910	van Beuren, Frederick T., Jr.
1906	Titus, Edward C.	1906	Van Cott, Joshua M.
1913	Titus, Henry W.	1927	Vander Veer, Albert, Jr.
1921	Titus, Norman E.	1924	Van Derwerker, Earl E.
1922	Tobin, Thomas J.	1931	Van Dyck, Laird S.
1933	Tolmach, Jesse Alfred	1922	Van Etten, Nathan B.
1909	Tompkins, Walstein M.	1920	Van Etten, Royal C.
1929	Toole, John	1906	Van Ingen, Philip
1891	Torek, Franz J. A.	1932	Van Orden, Thomas D.
1926	Touart, Maximin De M.	1906	Van Wagenen, Cornelius D.
1931	Touroff, Arthur S. W.	1908	Vaughan, Harold S.
1895	Tousey, Sinclair	1932	Vero, Frank
1928	Tow, Abraham	1926	Verplanck, Van Noyes
1902	Townsend, Terry M.	1916	Vietor, John A.
1933	Traeger, Cornelius Horace	1930	Vinciguerra, Michael
1925	Traub, Eugene F.	1890	Vineberg, Hiram N.
1907	Travell, J. Willard	1914	Virden, John E.
1932	Treves, Norman	1913	Vogel, Karl M.
1933	Trubek, Max	1908	Vogeler, William J.
1917	Truesdell, Edward D.	1903	Voislawsky, Antonie P.
1927	Tulipan, Louis	1927	von Glahn, William C.
1929	Turner, Joseph	1925	Von Sholly, Anna Irene
1906	Turnure, Percy R.	1928	Vorhaus, Martin G.
1932	Twinem, Francis Patton	1931	Wachsmann, Siegfried
1933	Twiss, John Russell		
1919	Tyson, Cornelius J.		

*Deceased.

1931	Wade, Preston A.	1912	Weinstein, Harris
1920	Wadhams, Robert P.	1927	Weintraub, Sydney
1927	Wagner, Lewis C.	1932	Weiss, Harry
1927	Waldie, Thomas E.	1930	Weissberg, Morris
1928	Waldman, David P.	1906	Welch, John E.
1904	Walker, Emma E.	1909	Welker, Franklin
1893	Walker, John B.	1894	Welt-Kakels, Sara
1903	Wallace, Charlton	1933	Wertham, Frederic
1904	Wallace, George B.	1914	Wessler, Harry
1904	Wallace, Henry	1916	West, Davenport
1931	Wallace, Robert Pulley	1929	West, Randolph
1904	Walsh, James J.	1927	Westermann, John J., Jr.
1920	Walsh, Robert E.	1931	Wexler, David
1891	Walter, Josephine	1911	Wheeler, John M.
1920	Walzer, Abraham	1928	Wheeler, Wm. L.
1933	Walzer, Matthew	1926	Wheelwright, Joseph S.
1933	Warbasse, James P.	1915	Whipple, Allen O.
1895	Ward, George Gray	1927	Whisenant, John R.
1910	Ward, George H.	1911	White, Francis W.
1908	Ward, Wilbur	1920	White, James W.
1901	Ware, Martin W.	1882	White, John Blake
1932	Warren, Arthur Fulton	1920	White, William C.
1914	Warren, Luther F.	1906	Whiting, Frederick
1897	Warsaw, M. Claudius	1920	Whitman, Armitage
1928	Warshaw, David	1927	Whittemore, W. Laurence
1925	Washburn, Arthur L.	1904	Wiener, Alfred
1921	Washton, Jacob	1914	Wiener, Herbert J.
1928	Watson, Benjamin P.	1900	Wiener, Joseph
1920	Watson, Cassius H.	1883	Wiener, Richard G.
1932	Watson, William L.	1908	Wiener, Solomon
1921	Webster, David H.	1918	Wiggers, August F. A.
1932	Webster, Jerome P.	1905	Wightman, Orrin S.
1919	Wechsler, Israel S.	1907	Wilcox, Herbert B.
1928	Weeden, Willis M.	1927	Wile, Ira S.
1928	Weeks, Carnes	1927	Wilens, Ira
1920	Weeks, Webb W.	1914	Wilensky, Abraham O.
1922	Weil, Henry L.		

1927	Wilhelm, Seymour F.	1931	Wollner, Anthony
1922	Willard, Luvia Margaret	1901	Wollstein, Martha
1893	Willard, Thomas H.	1911	Wood, Francis C.
1901	Williams, Anna W.	1931	Wood, Paul M.
1903	Williams, Charles M.	1924	Wood, Thomas D.
1918	Williams, Frankwood E.	1910	Woodruff, I. Ogden
1916	Williams, Horatio B.	1917	Woodruff, Stanley R.
1928	Williams, Jesse F.	1927	Woodruff, W. Stuart
*1904	Williams, Linsly R.	1928	Woody, McIver
1886	Williams, Mark H.	1904	Woolley, Scudder J.
1923	Williams, Percy H.	1891	Woolsey, George
1905	Williams, William R.	1896	Wootton, Herbert W.
1928	Williamson, Carolyn Gay	1917	Worcester, James N.
1918	Williamson, Hervey C.	1932	Wortis, S. Bernard
1931	Wilmoth, Clifford Lee	1917	Wright, Arthur M.
1905	Wilner, Anna S.	1932	Wright, Irving Sherwood
1918	Wilson, Arthur S.	1926	Wurtzel, George L.
1900	Wilson, Frederic N.	1932	Wurzbach, Frederick A., Jr.
1932	Wilson, Margaret Barclay	1918	Wyckoff, John H.
1917	Wilson, May G.	1910	Wyeth, George A.
1914	Wing, Lucius A.	1932	Yaguda, Asher
1927	Winkelstein, Asher	1908	Yeomans, Frank C.
1909	Wise, Fred	1910	Young, Anna R.
1928	Wishner, Joseph G.	1910	Young, Charles H.
1924	Witt, Dan Hiter	1928	Yudkowsky, Peter
1927	Woglom, William H.	1908	Zabriskie, Edwin G.
1922	Wolf, Charles	1921	Zadek, Isadore
1922	Wolf, George D.	1930	Zeiss, Robert F.
1912	Wolf, Heinrich Franz	1927	Ziegler, Jerome M.
1899	Wolff, Julius	1932	Zilboorg, Gregory
		1933	Ziporkes, Joseph
		1909	Zipser, Jacques E.
		1932	Zucker, Morris

RESIDENT MEMBERS

1934 Aufrecht, Gustave	1934 Knighton, Willis S.
1934 Averbuck, Samuel H.	1934 Lantzounis, Leon
1934 Bakwin, Ruth Morris	1934 Last, Murray A.
1934 Barenberg, Louis H.	1934 Lewin, Bertram David
1934 Bonaccolto, Girolamo	1934 Loeb, L. Farmer
1934 Burlingham, Robert	1934 Lorand, Sandor
1934 Butler, Charles St. John	1934 Lowrie, Robert J. 1934 McCauley, John Corran, Jr.
1934 Calman, Arthur S.	1934 Machacek, Gerald Frank
1933 Cipollaro, Anthony C.	1934 Malabre, Alfred L.
1934 Cohen, John	1934 Marks, Jerome A.
1934 Conklin, Reginald	1934 Marshall, Edward Ross
1934 Conway, Francis M.	1933 Martin, Hayes E.
1934 Damon, Virgil G.	1934 Mayer, Edgar
1934 Daniels, George E.	1934 Mittell, Edith A.
1934 Dargeon, Harold William	1934 Neal, Phil Hawkins
1934 de Cholnoky, Tibor	1934 O'Regan, John Alfred
1934 Denker, Peter G.	1934 Paton, Richard T.
1934 Farley, Olin Everett	1934 Rabin, Coleman B.
1934 Fordrung, William J.	1933 Rappaport, Israel
1933 Ginzburg, Leon	1934 Rice, John L.
1934 Golden, Braham H.	1934 Rosenthal, Nathan
1934 Goodman, B. A.	1934 Rothschild, L.
1933 Grace, Arthur William	Leonard
1934 Greenberg, Morris	1934 Rosenwasser, Harry
1934 Hallock, Halford	1934 Sala, Angelo M.
1934 Hanlon, Walter Gerard	1934 Sallick, Myron A.
1934 Holzapfel, William H.	1933 Schwartz, Alfred A.
1934 Janeway, Margaret McAllister	1934 Shields, Frances Emily
1934 Katz, Siegfried Elias	1934 Shuster, Mitchell
1934 Kelly, Richard J.	1934 Silvers, Seymour H.

1934 Stenbuck, Joseph B.	1934 Tuchman, Lester R.
1934 Topper, Anne	1934 Webster, Bruce
1934 Toumey, James W., Jr.	1934 Wender, Louis
1934 Traut, Herbert F.	1934 Williams, Frederick
1934 Travell, Janet	W.

NON-RESIDENT FELLOWS

1923 Ackerman, James F., Asbury Park, N. J.
1906 Adler, Herman M., Berkeley, Calif.
1903 Adriance, Vanderpoel, Williamstown, Mass.
1931 Ager, Louis C., Rutland Heights, Mass.
*1881 Allen, Thomas H., Lake Mahopac, N. Y.
1898 Alling, Arthur N., New Haven, Conn.
1931 Anderson, Alan R., Freeport, L. I., N. Y.
1888 Armstrong, Samuel T., Katonah, N. Y.
1932 Atkinson, Walter S., Watertown, N. Y.
1882 Bacon, Gorham, Yarmouthport, Mass.
1904 Baker, S. Josephine, Stamford, Conn.
1916 Baldwin, Edward R., Saranac Lake, N. Y.
1914 Baughman, William H., Oakland, Calif.
1931 Bedell, Arthur J., Albany, N. Y.
1921 Benson, Arthur W., Troy, N. Y.
1920 Bibby, Henry L., Kingston, N. Y.
1908 Black, John Fielding, White Plains, N. Y.
1920 Blaisdell, Russell E., Orangeburg, N. Y.
1918 Blake, Eugene M., New Haven, Conn.
1895 Blake, Joseph A., Tucson, Ariz.
1908 Blumer, George, New Haven, Conn.
1884 Boldt, Hermann J., White Plains, N. Y.
1927 Boltz, Oswald H., Binghamton, N. Y.
1919 Bonnell, Clarence H., Rye, N. Y.
1930 Booth, Arthur Woodward, Elmira, N. Y.
1897 Booth, Burton S., Troy, N. Y.
1931 Bourke, Victor G., Livingston Manor, N. Y.
1916 Bradbury, Samuel, Philadelphia, Pa.
1931 Bradner, M. Renfrew, Warwick, N. Y.
1929 Branham, Vernon, Albany, N. Y.

*Deceased.

- 1888 Brannan, John W., Camden, S. C.
1900 Brooks, Frank T., Litchfield, Conn.
1897 Brouner, Walter B., Asbury Park, N. J.
1907 Brown, David Chester, Danbury, Conn.
1915 Brown, Lawrason, Saranac Lake, N. Y.
1922 Brown, Sanger, 2nd, Albany, N. Y.
1934 Browning, Birt Lee, Newburgh, N. Y.
1905 Brownlee, Harris F., Danbury, Conn.
1917 Caples, Byron H., Reno, Nev.
1928 Cattell, Henry W., Burlington, N. J.
1923 Cavanaugh, Thomas E., Springfield, Mass.
1928 Cheever, Austin W., Boston, Mass.
1905 Chisholm, William A., Nova Scotia, Canada.
1911 Chittenden, Arthur S., Binghamton, N. Y.
1925 Christensen, Frederick C., Racine, Wis.
1930 Clarke, Thomas Wood, Utica, N. Y.
1885 Coe, Henry C., Washington, D. C.
1917 Cofer, Leland E., Palm Beach, Fla.
1907 Conaway, Walt P., Atlantic City, N. J.
1913 Conley, Walter H., Abroad.
1904 Connell, Karl, Winton Lodge, Branch, N. Y.
1920 Corbusier, Harold D., Plainfield, N. J.
1887 Currier, Charles G., Bernardsville, N. J.
1932 Currier, Gilman Sterling, Bernardsville, N. J.
1906 Curry, Grove P. M., Mt. Kisco, N. Y.
1929 Cutler, Max, Chicago, Ill.
1933 Dalldorf, Gilbert J., Valhalla, N. Y.
*1913 Davis, Fellowes, Jr., Paris, France.
1911 Day, Fessenden L., Bridgeport, Conn.
1879 De Garmo, William B., Coral Gables, Fla.
1911 Derby, Richard, Oyster Bay, L. I., N. Y.
1904 Divine, Alice, Ellenville, N. Y.
1930 Doan, Charles Austin, Columbus, Ohio.
1895 Dobson, William G., Poughkeepsie, N. Y.
1926 Dowling, J. Ivimey, Albany, N. Y.
1924 Dye, John Sinclair, Waterbury, Conn.
1920 Eaton, Henry Douglas, Los Angeles, Calif.
1890 Edgar, J. Clifton, Greenwich, Conn.

*Deceased.

- 1906 Estes, William L., S. Bethlehem, Pa.
1923 Farnell, Frederick J., Providence, R. I.
1922 Fauntleroy, Archibald M., Ossining, N. Y.
1928 Finch, Lew Henri, Amsterdam, N. Y.
*1911 Fitz, George W., Peconic, L. I., N. Y.
1912 Fitzgerald, Clara P., Worcester, Mass.
1894 Flint, Austin, Milbrook, N. Y.
1919 Flynn, Thomas J., Washington, D. C.
1910 Franklin, Melvin M., Philadelphia, Pa.
1913 Garcin, Ramon D., Richmond, Va.
1920 Gardner, Charles W., Bridgeport, Conn.
1922 Garvin, William C., Binghamton, N. Y.
1932 Gillette, David F., Syracuse, N. Y.
1929 Godfrey, Edward S., Jr., Albany, N. Y.
1897 Graves, Wm. B., Southport, Conn.
1908 Greenway, James C., New Haven, Conn.
1932 Gregg, Donald, Wellesley, Mass.
1901 Griffith, Frederic, Belmar, N. J.
1927 Haggart, Gilbert E., Boston, Mass.
1896 Hallock, Frank K., Cromwell, Conn.
1932 Hamilton, Samuel W., White Plains, N. Y.
1920 Hammond, Robert B., White Plains, N. Y.
1921 Harvey, Samuel Clark, New Haven, Conn.
1897 Haynes, Irving S., Plattsburg, N. Y.
1913 Hebert, Paul Z., Los Angeles, Calif.
1921 Heddens, Vernon O., Pasadena, Calif.
1910 Henderson, Alfred C., Stamford, Conn.
1911 Herring, Robert A., Washington, D. C.
1915 Hicks, Horace M., Amsterdam, N. Y.
1915 Hill, Miner C., Oyster Bay, L. I., N. Y.
1933 Hirshfeld, Samuel, Los Angeles, Calif.
1915 Holding, Arthur F., Albany, N. Y.
1927 Holters, Otto R., Asbury Park, N. J.
1915 Howland, De Ruyter, Stratford, Conn.
1918 Huffman, Otto V., Mt. Kisco, N. Y.
1916 Hughes, Frederic J., Plainfield, N. J.
1923 Hutchison, Fred R., Huntingdon, Pa.
1903 Hyde, Fritz Carleton, Dennis, Mass.

- 1933 Jameison, Gerald Reid, White Plains, N. Y.
1908 Jameson, James W., Concord, N. H.
1912 Jean, George W., Santa Barbara, Calif.
1918 Jenison, Nancy, Bound Brook, N. J.
1906 Kann, Ulysses S., Binghamton, N. Y.
1925 Kempf, Edward John, Wading River, L. I., N. Y.
1895 Kilham, Eleanor B., Beverly, Mass.
1927 Klein, Alvin W., Stockbridge, Mass.
1932 Krieger, William Andrew, Poughkeepsie, N. Y.
1927 Kutil, Henry R., Huntington, L. I., N. Y.
1931 Lane, Clarence Guy, Boston, Mass.
1912 Lathrope, George H., Morristown, N. J.
1923 Lawrence, Watson A., White Plains, N. Y.
1926 Lawton, Richard John, Terryville, Conn.
*1896 Leach, Philip, U. S. N.
1910 Leake, James Payton, Washington, D. C.
1926 Leshin, Hiram R., Port Chester, N. Y.
1924 Levinson, Bernard, Freeport, L. I., N. Y.
1912 Longcope, Warfield T., Baltimore, Md.
1894 Lowe, Russell W., Ridgefield, Conn.
1904 Lynch, Robert J., Bridgeport, Conn.
1927 MacAusland, W. Russell, Boston, Mass.
1909 MacCallum, William G., Baltimore, Md.
1924 McCann, William S., Rochester, N. Y.
1908 McGavock, Edward P., Richmond, Va.
1928 McGraw, Arthur B., Detroit, Mich.
1920 Mackenzie, George M., Cooperstown, N. Y.
1931 McKiernan, Robert L., New Brunswick, N. J.
1885 McKim, W. Duncan, Washington, D. C.
1931 Madill, Grant C., Ogdensburg, N. Y.
1928 Marcoglou, Angelos E., Athens, Greece.
1899 Marvel, Philip I., Atlantic City, N. J.
1884 Mendelson, Walter, Philadelphia, Pa.
1923 Mendez, Albert A., Punta San Juan, Cuba.
1919 Mendillo, Anthony J., New Haven, Conn.
1920 Merriman, M. Heminway, Waterbury, Conn.
1926 Messing, Arnold, Newburgh, N. Y.
1926 Metzger, Jeremiah H., Tyrone, N. M.

*Deceased.

- 1905 Meyer, Adolf, Baltimore, Md.
1907 Mial, L. Le May, Morristown, N. J.
1900 Miles, Henry S., Bridgeport, Conn.
1927 Miller, John, Greenwich, Conn.
1933 Morgan, Audrey Goss, Washington, D. C.
1912 Morgan, William Gerry, Washington, D. C.
1921 Morrissey, Michael J., Hartford, Conn.
1931 Morse, Russell Wright, Minneapolis, Minn.
1916 Mott, Walter W., White Plains, N. Y.
1930 Mullins, Samuel F., Danbury, Conn.
1892 Munger, Carl E., Waterbury, Conn.
1918 Munn, Aristine P., West Long Branch, N. J.
1927 Murray, Henry A., Jr., Boston, Mass.
1932 Nelms, Homer L., Albany, N. Y.
1916 Neuman, Leo H., Albany, N. Y.
1923 Neumann, Theodore W., Central Valley, N. Y.
1902 Nicoll, Matthias, Jr., Rye, N. Y.
1913 Ober, George E., Bridgeport, Conn.
1906 Oertel, Horst, Montreal, Canada.
1910 Oppenheimer, Frederick G., San Antonio, Texas.
1897 Orleman-Robinson, Daisy M., Meridale, N. Y.
1927 Overton, Frank, Patchogue, L. I., N. Y.
1919 Painter, Henry McM., Paris, France.
1912 Parker, Edward O., Greenwich, Conn.
1932 Parran, Thomas, Jr., Albany, N. Y.
1894 Parry, Angenette, Boston, Mass.
1909 Parry, Eleanor, Huntington, L. I., N. Y.
1910 Pearson, Henry, Center Conway, N. H.
1919 Pellini, Emil J., Peekskill, N. Y.
1923 Penfield, Wilder G., Montreal, Canada.
1922 Perkins, C. Winfield, Norwalk, Conn.
1921 Philips, Carlin, Miami, Fla.
1896 Pierson, Samuel, Stamford, Conn.
*1898 Pilgrim, Charles W., Central Valley, N. Y.
1904 Pinkham, Edward W., Sarasota, Fla.
1926 Purdy, Sylvanus, White Plains, N. Y.
1889 Quinlan, Francis J., Amawalk, N. Y.
1922 Rainey, John J., Troy, N. Y.

*Deceased.

- 1919 Raynor, Mortimer W., White Plains, N. Y.
1909 Reid, George C., Rome, N. Y.
1930 Reifenstein, Edward C., Syracuse, N. Y.
1928 Reilly, Thomas F., Springfield, Mass.
1916 Reynolds, Harry S., Hartford, Conn.
1921 Richardson, Henry B., Darien, Conn.
1932 Richardson, Ralph A., Bristol, Conn.
1905 Riggs, Austen Fox, Stockbridge, Mass.
1917 Robert, Daniel R., New Lebanon Center, N. Y.
1925 Roberts, Edward R., Bridgeport, Conn.
1904 Robertson, Joseph A., Dallas, Texas.
1901 Robinovitch, Louise G., Golden, Colo.
1920 Robinson, Horace Eddy, Pleasantville, N. Y.
1924 Rooney, James Francis, Albany, N. Y.
1894 Root, Edward K., Hartford, Conn.
1931 Ross, William H., Brentwood, L. I., N. Y.
1896 Rushmore, Edward C., Tuxedo Park, N. Y.
1920 Russell, Thomas Hubbard, New Haven, Conn.
1927 Russell, William L., White Plains, N. Y.
1913 Russell, Worthington S., Woodbury Falls, Orange
Co., N. Y.
1928 Ryder, Morton, Rye, N. Y.
1905 Sadlier, James E., Poughkeepsie, N. Y.
1907 Sauer, J. George, St. Petersburg, Fla.
1927 Savarese, Melchior F. R., New Haven, Conn.
1896 Schavoir, Frederick, Stamford, Conn.
1922 Schwatt, Herman, Sanatorium, Colo.
1914 Scofield, Raymond B., Olmstedville, N. Y.
1911 Scruton, William A., Abroad.
1925 Seecof, David P., Montreal, Can.
1914 Seff, Isadore, Miami, Fla.
1929 Shamaskin, Arnold, Bedford Hills, N. Y.
1904 Sharp, Edward A., Buffalo, N. Y.
1926 Sheahan, William L., New Haven, Conn.
1905 Shelby, Edmund P., Venice, Fla.
1925 Simpson, Charles A., Washington, D. C.
1915 Slocum, Harry B., Long Branch, N. J.
1909 Smart, Isabelle T., Manasquan, N. J.
1914 Smith, Dorland, Bridgeport, Conn.
1908 Smith, E. Terry, Hartford, Conn.

- 1927 Smith, Ernest B., Philadelphia, Pa.
 1909 Smith, George Milton, Pine Orchard, Conn.
 1921 Smith, Scott L., Poughkeepsie, N. Y.
 1920 Snyder, William H., Newburgh, N. Y.
 1908 Sorapure, Victor E., London, England.
 1894 Spence, Daniel B., Holmes, Dutchess Co., N. Y.
 1914 Sperry, Frederick N., New Haven, Conn.
 1933 Sprague, George S., White Plains, N. Y.
 1932 Standish, E. Myles, Hartford, Conn.
 1933 Steiner, Walter, Hartford, Conn.
 1915 Stone, Harry Russell, Clinton, Conn.
 1898 Stone, William S., Norwalk, Conn.
 1909 Storey, Thomas A., Stanford Univ., Calif.
 1912 Stover, Charles, Amsterdam, N. Y.
 1907 Stratton, Edward A., Danbury, Conn.
 1929 Strauss, Maurice J., New Haven, Conn.
 1913 Strobell, Charles W., San Diego, Calif.
 1917 Sweet, Charles C., Ossining, N. Y.
 1932 Ten Broeck, Carl, Princeton, N. J.
 1918 Terry, Benjamin T., Tacoma, Wash.
 1904 Thompson, Hugh C., Lakeville, Conn.
 1918 Thoms, Herbert, New Haven, Conn.
 1895 Toms, S. W. Spencer, Nyack, N. Y.
 1924 Tooker, Harold Clifton, Springfield, Mass.
 1928 Torrey, Harry Beal, Palo Alto, Calif.
 1932 Trible, George Barnet, Washington, D. C.
 1923 Turrell, Guy H., Smithtown Branch, L. I., N. Y.
 1916 Vander Bogert, Frank, Schenectady, N. Y.
 1902 Van Vranken, Gilbert, Altadena, Calif.
 1928 Vessie, Percy R., Ossining, N. Y.
 1924 Vier, Henry John, White Plains, N. Y.
 1896 Vietor, Agnes C., Boston, Mass.
 1905 von Tiling, Johannes H. M. A., Poughkeepsie, N. Y.
 1931 Voss, Fred H., Tucson, Arizona.
 1907 Wadsworth, Augustus B., Albany, N. Y.
 1918 Wahlig, Herman G., Sea Cliff, Nassau Co., N. Y.
 *1904 Wainwright, Jonathan M., Scranton, Pa.
 1889 Waldo, Ralph, Westhampton, N. Y.

*Deceased.

- 1910 Wallin, Mathilda K., Elmsford, N. Y.
1931 Warner, George H., Bridgeport, Conn.
1915 Warner, John W., Washington, D. C.
1931 Webb, Gerald Bertram, Colorado Springs, Colo.
1886 Weeks, John E., Portland, Ore.
1925 Weigel, Elmer P., Plainfield, N. J.
1928 Weil, Arthur, Chicago, Ill.
1932 Weise, Ellwood C., Bridgeport, Conn.
1932 West, Theodore Stephen, Port Chester, N. Y.
1909 White, Davenport, Washington, D. C.
1928 White, John F., Port Chester, N. Y.
1933 White, William Beverly, Stamford, Conn.
1932 White, William Charles, Washington, D. C.
1891 Whitman, Royal, London, England.
1926 Wyatt, Bernard L., Tucson, Ariz.
1924 Wynkoop, Edward J., Syracuse, N. Y.
1923 Yudkin, Arthur M., New Haven, Conn.

NON-RESIDENT MEMBERS

- 1934 Cone, William Vernon, Montreal, Canada.
1934 Estes, William L., Jr., Bethlehem, Pa.
1934 Hume, Edgar Erskine, Washington, D. C.
1934 Reynolds, Harry Stephen, Hartford, Conn.
1934 Turnley, William H., Stamford, Conn.
1934 Wall, James H., White Plains, N. Y.

ASSOCIATE FELLOWS

- 1928 Achilles, Edith M., New York.
1928 Armstrong, Clairette P., New York.
1912 Beard, Stanley Drew, Pearl River, N. Y.
1932 Benedict, Stanley R., New York.
1930 Benson, Charles Emile, New York.
1933 Berger, Adolph, New York.
1930 Blanchard, Kenneth C., New York.
1926 Bodecker, Charles F., New York.
1933 Bouton, Clyde S., New York.
1930 Bowerman, Walter G., Leonia, N. J.
1932 Brand, Erwin, New York.
1929 Bryant, Louise Stevens, Bronxville, N. Y.

- 1932 Cahn, Lester R., New York.
1930 Carr, Malcolm W., New York.
1928 Chambers, Robert, New York.
1930 Clarke, H. T., New York.
1922 Cooke, Elizabeth, Stamford, Conn.
1925 Corwin, E. H. L., New York.
1930 Dakin, Henry D., Scarborough-on-Hudson, N. Y.
1910 Davenport, Charles B., Cold Spring Harbor, N. Y.
1930 Detwiler, Samuel R., New York.
1933 Dunbar, Helen Flanders, New York.
1928 Dunning, William B., New York.
1920 Fine, Morris S., Battle Creek, Mich.
1927 Flinn, Frederick B., New York.
1926 Folks, Homer, New York.
1930 Fry, Henry J., New York.
1928 Gies, William J., New York.
1932 Goebel, Walther F., New York.
1932 Goldforb, Abraham J., New York.
1927 Green, Leo, New York.
1914 Greenwald, Isidor, New York.
1911 Harris, Isaac F., Tuckahoe, N. Y.
1928 Hartman, Leroy L., New York.
1930 Hellman, Milo, New York.
1930 Hirschfeld, Isador, New York.
1930 Holmes, Joseph L., New York.
1932 Kahn, Morton C., New York.
1927 Kingsbury, John A., New York.
1930 Kleiner, Israel S., Brooklyn.
1928 Kopeloff, Nicholas, New York.
1923 Krasnow, Frances, New York.
1932 Landis, Carney, New York.
1905 Lee, Frederic S., New York.
1921 Little, Clarence C., New York.
1928 McCaffrey, Francis S., New York.
1931 McFarland, Ross A., New York.
1926 Miller, Edgar Grim, Jr., New York.
1928 Myers, Chester N., Yonkers, N. Y.
1923 Myers, Victor C., Cleveland, Ohio.
1927 Neuwirth, Isaac, New York.
1928 Noback, Gustave J., New York.

- 1932 Northrop, John H., Princeton, N. J.
 1927 Oppenheimer, Enid Muriel, New York.
 1932 Osterhout, W. J. V., New York.
 1928 Palmer, Bissell B., New York.
 1927 Paulsen, Alice E., New York.
 1931 Paynter, Richard H., Brooklyn.
 1929 Renshaw, Raemer Rex, New York.
 1927 Scott, Ernest L., New York.
 1918 Seaman, Emily C., New York.
 1931 Shuman, Harry Benjamin, Boston.
 1928 Smith, Bertram G., New York.
 1929 Smith, Homer Wm., New York.
 1928 Sobotka, Harry H., New York.
 1904 Soper, George A., Great Neck, L. I., N. Y.
 1926 Strong, Oliver Smith, New York.
 1930 Sydenstricker, Edgar, New York.
 1928 Tallman, Gladys G., New York.
 1928 Torrey, John C., New York.
 1927 Tracy, William D., New York.
 1932 Van Slyke, Donald D., New York.
 1928 von Wedel, Hassow O., Ardsley-on-Hudson, N. Y.
 1927 Waugh, Leuman M., New York.
 1927 Weinberger, Bernhard W., New York.

ASSOCIATES

- 1933 Bellows, Marjorie T., White Plains.
 1934 Cannan, Robert Keith, New York.
 1933 Fischer, Robert Morris, New York.
 1934 Harrow, Benjamin, New York.
 1933 Schweitzer, Jerome M., New York.

RECAPITULATION

	<i>Number</i>
Resident Fellows & Members.....	1,659
Non-Resident Fellows & Members.....	219
Associate Fellows & Associates.....	80
Fellows on Exempt List.....	190
Fellows & Members on Teaching or Research List..	126

HONORARY FELLOWS

- Abel, John Jacob, Sc.D., LL.D. Baltimore.
- Achard, Charles, M.D. Paris.
- Alessandri, Roberto, M.D. Rome.
- Archibald, Edward William, M.D. Montreal.
- Ballance, Sir Charles, C.B., M.V.O., LL.D., M.S., F.R.C.S. London.
- Banting, Frederick Grant, M.C., M.D., F.R.C.S., Ds.C., LL.D. Toronto.
- Barany, Robert, M.D. Upsala, Sweden.
- Bastianelli, Raffaele, M.D. Rome.
- Bordet, Jules, M.D. Brussels.
- Chagas, Carlos. Rio de Janeiro.
- Chittenden, Russell Henry, Ph.B., Ph.D., LL.D. New Haven.
- *Curie, Marie Sklodowska, D.Sc. Paris.
- Cushing, Harvey W., M.D., Sc.D., LL.D., F.R.C.S., D.S.M. New Haven.
- Dale, Sir Henry Hallett, C.B.E., M.A., M.D., F.R.S., F.R.C.P. London.
- de Schweinitz, George E., M.D., LL.D. Philadelphia.
- Dock, George, M.D., Sc.D. Pasadena.
- Farrand, Livingston, M.D., LL.D. Ithaca.
- Finney, John M. T., M.D., F.R.C.S., D.S.M. Baltimore.
- Foerster, Otfried, M.D. Breslau.
- Forssell, Carl G., M.D. Stockholm.
- Fournier, Alfred, M.D. Paris.
- Head, Sir Henry, M.D., F.R.C.P., LL.D., F.R.S. London.
- Herrick, James Bryan, M.D. Chicago.
- Hopkins, Sir Frederick Gowland, M.B., D.Sc., LL.D., F.R.C.P., F.R.S. Cambridge.
- Howell, William H., Ph.D., Hon. M.D., LL.D. Baltimore.
- Jackson, Chevalier, M.D. Philadelphia.
- Jadassohn, Josef, M.D. Breslau.
- Kappers, Cornelius Ubbo Ariens, M.D. Amsterdam.
- Kitasato, S., M.D. Tokio.
- Krogh, August, Ph.D., Hon. LL.D. Copenhagen.

*Deceased.

- Leriche, René, M.D., D.Sc. Strasbourg.
Lewis, Sir Thomas, C.B.E., M.D., F.R.C.P., D.Sc., F.R.S.
London.
Marie, Pierre, M.D. Paris.
Martin, Sir Charles James, C.M.G., M.B., D.Sc., LL.D.,
F.R.S. London.
Matas, Rudolph, M.D., LL.D., F.A.C.S. New Orleans.
Minot, George Richards, M.D. Boston.
Moynihan, Rt. Hon. Lord Berkeley, K.C.M.G., C.B.,
LL.D., M.S., F.R.C.S. Leeds.
Neufeld, Friedrich, M.D. Berlin.
Newman, Sir George, K.C.B., M.D., D.C.L., LL.D.
London.
Novy, Frederick George, Sc.D., M.D., LL.D., Ann Arbor.
Pavlov, Ivan Petrovic, M.D. Leningrad.
Putti, Vittorio, M.D. Bologna.
*Ramón y Cajal, Santiago, M.D. Madrid.
Regaud, Claude, M.D. Paris.
Rolleston, Sir Humphry D., Bt., M.D., D.Sc., D.C.L.,
LL.D. Cambridge.
Sherrington, Sir Charles S., O.M., G.B.E., M.D., LL.D.,
F.R.S. Oxford.
*Smith, Theobald, M.D., Sc.D. Princeton.
Spiller, William Gibson, M.D. Philadelphia.
Vogt, Alfred, M.D. Zurich.
von Müller, Friedrich, M.D. Munich.
*Welch, William Henry, A.B., M.D., LL.D. Baltimore.
Wenckebach, Frederick Karel, M.D. Vienna.

CORRESPONDING FELLOWS

- Castex, Mariano R., Professor of Clinical Medicine,
Buenos Aires.
Clerc, P., Professor of Medical Pathology, Paris.
Faber, Knud H., Professor of Medicine, Copenhagen.
Fernandez, Francisco Maria, Sanitarian, Havana.
Fraser, John Smith, Oto-Laryngologist, Edinburgh.
Govaerts, Paul, Internist, Brussels.

*Deceased.

- Kappers, Cornelius Ubbo Ariens, Neuro-Anatomist, Amsterdam.
- Lichtwitz, Leopold, Professor of Internal Medicine, Altona.
- Moore, Henry Francis, Professor of Medicine, Dublin.
- Pick, Ernst Peter, Professor of Pharmacology, Vienna.
- Poll, Heinrich, Professor of Anatomy, Hamburg.
- Schmieden, Viktor Gottfried O., Professor of Surgery, Frankfurt.
- Sierra, Lucas, Professor of Clinical Surgery, Santiago.
- Snapper, I., Professor of Pharmacology, Amsterdam.
- Syllaba, Ladislav, Professor of Pathology, Prague.
- Vallery-Radot, Joseph Louis Pasteur, Internist, Paris.
- Wilson, Charles McMoran, Dean, St. Mary's Medical School, London.

BENEFACTORS

- | | |
|---|---|
| *Agnew, Cornelius Rea,
M.D., New York. | *Draper, William Henry,
M.D., New York. |
| *Baker, George F.,
New York. | *Dubois, Abram, M.D.,
New York. |
| *Brown, James M.,
New York. | *Farnham, Horace Putnam,
M.D., New York. |
| *Bruce, Frederick T.
Clark, Robert S.,
Cooperstown, N. Y. | Farnham, Mrs. Eliza C.,
New York. |
| *Cleveland, Hon. Grover,
Princeton, N. J. | *Flower, Hon. Roswell P.,
New York. |
| *Curtis, Henry Holbrook,
M.D., New York. | *Ford, James B., New York. |
| *Cushman, James S., M.D.,
New York. | *Fowler, Edward Payson,
M.D., New York. |
| *Dodge, William E.,
New York. | Harkness, Edward S.,
New York. |
| | *Harriman, Mrs. E. H.,
New York. |

*Deceased.

- *Herrick, Everett, M.D.,
New York.
- *Hosack, Alexander E.,
M.D., New York.
- *Hosack, Mrs. Celine B.,
New York.
- *Inslee, S., New York.
- *Jacobi, Abraham, M.D.,
New York.
- *James, D. Willis,
New York.
- *James, Walter B., M.D.,
New York.
- *Jenkins, Mrs. Helen Hartley,
New York.
- *Kennedy, John S.,
New York.
- Ladd, Mrs. Kate Macy,
New York.
- *Loomis, Alfred Lee, M.D.
New York.
- McLean, Elizabeth Cutting,
New York.
- *Meyer, Jacob, New York.
- *Mills, D. Ogden, New York.
- *Morgan, J. Pierpont,
New York.
- *Purple, Edwin Ruthven,
New York.
- *Purple, Samuel Smith,
M.D., New York.
- *Starr, Charles J.,
New York.
- *Starr, M. Allen, M.D.,
New York.
- Tucker, Carll, New York.
- Tucker, Mrs. Marcia Brady,
New York.
- Vanderbilt, Frederick W.,
New York.
- Whitney, Mrs. Gertrude
Vanderbilt, New York.
- Wilson, Margaret Barclay,
M.D., New York.
- *Woerishoffer, Mrs. Anna,
Vienna.
- *Woerishoffer, Charles F.,
New York.
- *Wood, William H. S.,
New York.

*Deceased.

NOTES

HOSACK BED FOR SICK AND NEEDY PHYSICIANS

Attention is directed to the following extract from the will of Mrs. Celine B. Hosack:

"I do give and bequeath unto my executors, hereinafter named, the sum of Ten Thousand Dollars, in trust to apply and pay the same (or so much thereof as may be necessary) to The Roosevelt Hospital in the City of New York, to purchase a bed which, in memory of my husband, shall be known as the Hosack Bed, and which shall be occupied from time to time by such sick and needy physicians as may for that purpose be named or designated by the President and Treasurer for the time being of The New York Academy of Medicine."

DONATIONS TO THE LIBRARY FUNDS

Donations and bequests are solicited by The New York Academy of Medicine for the maintenance and expansion of the Library.

A donation or bequest of \$5,000 or more will provide for a special library fund, the income of which may be used for the general purposes of the Library or restricted to the purchase of books and periodicals, as the donor or testator may indicate.

FORM OF REQUESTS

The following is a brief legal form as a suggestion under which bequests may be made in behalf of the Academy:

I give, devise and bequeath unto "The New York Academy of Medicine" of the City of New York, State of New York, a corporation duly incorporated by the Legislature of the State of New York by an act entitled, "An Act to Incorporate The New York Academy of Medicine," passed June 23, 1851, and amended June 4, 1853, June 2, 1877, and April 25, 1924. . . .

BULLETIN OF
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THE MODERN ATTITUDE TOWARD
TRAUMATIC CANCER*

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Many recent and fundamental contributions on the causation of tumors have an important bearing on the relation of trauma to cancer. When nothing definite was known about the effective exciting factors in mammary cancer it was permissible to adopt the traumatic theory in cases in which the clinical evidence pointed strongly that way. Now that we know that mammary cancer in mice can be produced by overstimulation by folliculin, whereas no one has succeeded in producing this disease by trauma, the traumatic origin becomes much less acceptable. Experimental cancer has now been produced by many agents, but always under quite specific conditions, not related to trauma, and these experimental data reveal the fact that cancer genesis requires quite peculiar factors which have not been found in the results of simple trauma.

The newer revelations regarding the physiological significance of tumors cannot fail to modify views concerning the possible relation to simple trauma. At one time it seemed necessary to assume that many cases of giant cell tumor of bone resulted from injury, but since it has appeared that this disease is related to functional dis-

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turbance of the parathyroid gland and that giant cell tumors may be produced by hyperparathyroidism, and cured by extirpation of tumors of the parathyroid, it becomes unnecessary to introduce the idea of trauma into the etiology of giant cell tumors. The application of dibenzanthracene in experimental animals produces cancer and sarcoma promptly and almost invariably, whereas the innumerable efforts to cause tumors by simple trauma have always failed. This contrast cannot fail to impress thoughtful observers with the impression that when we deal with real cancerogenic agents the results are definite, positive and even startling, and that the negative results of trauma indicate that trauma does not possess the essential elements of a cancerogenic agent. Knox has reviewed many of the old and recent efforts to produce tumors by trauma, all of which have failed.

These and many other contributions of the past two decades have greatly widened the breach between the real causation of malignant tumors and the theory of trauma, and these new facts must be fully considered in forming opinions regarding the traumatic origin of any given tumor. However, the new facts do not warrant one in excluding trauma as a possible cause of many tumors. The clinical evidence is too substantial in many cases to be dismissed on theoretic grounds. Recent knowledge merely demands that the evidence favoring trauma must be scrutinized more closely and great importance must be given to other factors which are more in line with the known effective exciting causes of neoplasms.

While it is now generally agreed that a single trauma never produces a malignant tumor in previously normal tissue, this principle may not greatly reduce the medico-legal importance of injury as an indirect cause of tumors. When a lacerated wound of the skin with implantation of foreign material fails to heal, becomes infected and suppurates for weeks or months, and cancer finally appears in the edges, it is clear that the cancer would not have occurred without the trauma.

The essential characters of medico-legal evidence.

One of the chief difficulties in the estimation of the frequency of traumatic cancer is the uncertainty of the statements of interested patients. Juries and compensation courts may accept the statements of claimants at face value, but medical science cannot indulge sympathies or make loose assumptions. To have medico-legal value, the statements of claimants must be supported by circumstantial evidence. Even the assertions of eye-witnesses, which have a certain corroborative value, cannot be accepted as facts unless supported by circumstantial evidence. There have been many striking instances where the positive assertions of several eye-witnesses were proven wrong by circumstantial evidence which was inconsistent with such statements. For example, a man was seen by several near-by persons to run out of a saloon, followed immediately by an assailant who stabbed the victim in the back with a knife. The assailant was tried for murder, but acquitted because the autopsy disclosed that the victim had died of a deep wound of the liver, and delivered from in front, while the observed knife wound had barely penetrated the skin of the back.

Therefore, all statements of claimants and eye-witnesses, regarding accidents should be supported by concrete evidence, readily verifiable, and relating to the locality of the accident, the objects alleged to have been concerned, and the possibility of the occurrence of the injury described by the claimant. If such necessary evidence were secured, the reports of traumatic cancer in the literature would be enormously reduced.

Without attributing any deliberate intention of any claimant to falsify the facts, every student of psychology knows that the human mind is strongly influenced by pre-conceived notions and by self interest. The wish is father to the thought. By repeatedly asserting facts of which the individual is at first uncertain, it is possible to render the mind entirely convinced of the reality of incidents that have not occurred in fact. At any rate, for scientific pur-

poses, these laws of psychology must be regarded in all inquiries concerned with the traumatic origin of tumors. When the patient's doctor, on whom the patient's life may depend, begins an inquiry by displaying an obvious interest in establishing a traumatic history, the patient invariably responds with a vivid imagination, and the doctor himself becomes a victim of his own efforts. Even the most judicially trained minds are not free from this subtle influence. When the U. S. Supreme Court, in 1876, was called upon to decide whether Samuel J. Tilden or Rutherford B. Hayes had been elected president, the evidence consisted of certain verifiable facts, but the four Republican members voted in favor of Hayes, and the three Democratic members voted for Tilden.

Having investigated many cases in which the statements of patient and friends clearly indicated a traumatic origin of a tumor, only to find that these statements were unreliable, I have become convinced that the chief task of the medico-legal expert is not one of theoretical reasoning and argument, but almost entirely that of laborious fact-finding. It requires time, patience and ingenuity to establish the facts in cases of alleged traumatic tumors, and unless these efforts are competently made, the report of any given case is, for scientific purposes, worthless.

An intelligent young woman, free from any thought of compensation, presented herself at the Memorial Hospital with the following history. In August, 1934, she stated that she had fallen out of a swing and struck violently on a gravel bed bruising the palm (but not the wrist?) of her right hand. She paid little attention to the incident. One month later she noticed that the fingers of the hand were contracting, and this condition became steadily worse until November, when she went to an orthopedic hospital where a pronounced Dupuytren's contraction was found, with marked nodular thickening of the whole palm. The palmar fascia was then liberally excised. The material showed, on section, a cellular neurogenic fibrosarcoma of considerable malignancy, tumor cells infiltrating the nerve trunks throughout. She stated that before the accident the hand was entirely normal, because she was able to use the typewriter as her occupation, without difficulty. Here was a most circumstantial and convincing story pointing clearly to a traumatic neurogenic fibrosarcoma. (1)—The previous integrity of the tissues was adequately shown by the lack of interference in using the typewriter. (2)—The authenticity of the trauma was well established by

the violent fall under unusual conditions, which she stated was witnessed by three friends. (3)—The nature, probable age, and active growth of the tumor completely coincided with the story.

However, it was determined to make a systematic effort to break down the facts in the story, and two physicians devoted several hours to the task. It required three interviews to prove that the swing story was a fiction. To one interrogator she failed to mention the swing and referred the trouble to overuse of the broom. She had just been separated from her husband and he could not be found. Her brother-in-law was in camp in Canada (December 15?), and could not be reached, and her sister-in-law (who should have been her sister) was with him. Thus none of the alleged witnesses could be reached. She finally admitted that she had not used the typewriter for three years. A review of new sections from other parts of the tumor material revealed much old hyaline fibrous tissue, completely devoid of cells which must have existed much longer than the three months alleged duration of the tumor.

The probability of coincidence of trauma and cancer.

Assuming that every tumor that arises after trauma is of traumatic origin, the incidence of traumatic tumors still remains extremely low. In the records of the New York State Industrial Compensation Bureau, Lewy found 37 cases of malignant tumors among 26,389 injured persons. In few of these cases could the traumatic origin be established as reasonable. This ratio is about the normal incidence of tumors among the general population. Some French medico-legal experts report the occurrence of as low as five or six traumatic tumors among 100,000 injuries. Many authors have remarked upon the very small number of traumatic tumors observed during the Great War (Knox Lit.). According to von Bungener (Cit. by Ullmann), in all the German University clinics, during a long period of observation, not more than 100 certified traumatic tumors have been recorded. From these data one must conclude that trauma itself has generally very little tendency to produce malignant reactions in tissues and when it does so the conditions must be peculiar.

Not only those persons who develop supposedly traumatic tumors, but all classes of the population, especially young persons and artisans, are constantly exposed to injuries mild and substantial to which they pay no atten-

tion. The National Safety Council reports that in the United States there were in 1933, 8,730,000 disabling injuries. There must have been many more of milder type to which tumors are generally referred. The skin, the bones, and the female breast are especially exposed to such injuries. There is thus established a strong probability that by mere coincidence any portion of the body which develops a tumor has within a recent date received some blow. Yet this argument loses some force when it appears that the tumor develops shortly after an unusual injury and at the exact point injured.

The probability of coincidence becomes more clearly revealed when one considers the time factor in the development of cancer. Cancer does not develop suddenly. The precancerous changes leading to cancer cover a period of months and sometimes years before the signs of established disease appear. During all this time the tissues are exposed to the usual traumas, mild and severe, to which the average person in active life is subjected. If at any time during this long period a trauma occurs at the site of the precancerous lesion, the subsequent cancer may erroneously be attributed to the trauma, whereas it is in reality the inevitable result of the progress of precancerous changes which have nothing to do with the trauma.

The coincidence of two very rare events raises a presumption but does not prove that there must be a causal relation between them.

A man fell backward on a cellar floor fracturing the spinous process of the 7th cervical vertebra. Two months later he complained of a nodular thickening along the brachial plexus and marked atrophy of the muscles of the hand. A slowly growing fibrosarcoma of the brachial plexus was disclosed, running a course of three years. The previous history could not be established, but it is reasonably certain that the tumor antedated the injury which was limited exactly to the spinous process, with normal healing. Here the coincidence of two rare events seems to create a presumption of a causal relation. A positive opinion could not be given because of imperfect fact-finding, especially regarding the previous condition of the patient, the immediate neurological effects of the injury, and the exact date of appearance of the atrophy.

A child was run over by an automobile, the wheel passing over the pelvis. It was taken immediately to a hospital, and operated upon for hematuria. A Wilms' tumor of the kidney was found. Such incidents show that rare tumors and peculiar accidents may coincide.

All these considerations justify the attitude of medico-legal experts, who refuse to regard a history of previous trauma as an adequate explanation of any given tumor, and who insist in subjecting the evidence to close scrutiny in each case, and who are inclined to give superior weight to the presence of other well known and adequate causes. Accordingly, several definite criteria have been widely recognized as essential conditions for the acceptance of a traumatic origin of a tumor.

ESSENTIAL CRITERIA

1.—*The authenticity and adequacy of the trauma.*

The fact that an injury actually occurred is generally accepted on the statement of the patient, but while such evidence may be accepted by the courts, it must be regarded as inadequate for strictly scientific purposes for reasons previously explained. Such evidence must be corroborated by eye-witnesses or better by circumstantial evidence such as the immediate discovery of signs of injury by an intelligent layman or a physician. In many instances only competent medical examination is worthy of credence. In the absence of corroboration the circumstances of the injury should be carefully investigated, the nature of the terrain, the actual existence of objects alleged to have been concerned, the exact sequence of events, and the possibility that the incidents described could have occurred or have resulted in the alleged injury. Many a case falls down when a simple orderly inquiry of this sort is pursued.

The exclusion of previous injuries of the same sort is necessary, otherwise the condition amounts to chronic irritation and not trauma in the strict sense. Shop women frequently bump their breasts in pulling out rolls of goods. Hod carriers constantly bruise their shoulders by the weight of the hod. Many persons repeatedly strike shin, or

hip, or shoulder, against projecting objects to which they are daily exposed. Machine operators frequently strain or bruise certain tissues which are especially exposed in their particular occupations. Tumors which arise under such circumstances are more properly regarded as occupational diseases than traumatic tumors.

The trauma must be adequate to produce some alteration in the structure of the tissue and the least effect it can give is rupture of small blood vessels with hemorrhage and discoloration of the skin. It should also be capable of exciting some regenerative process, otherwise it is difficult to conceive how it can excite excessive and abnormal proliferation of cells.

Much importance attaches to the character of the wound, and of the instrument causing it. Clean surgical incisions never lead to cancer. The presence of retained blood clot or fragments of necrosing tissue provide conditions in which abnormal reactions may conceivably occur. When foreign bodies or irritating chemicals, such as acids, tar, wood, etc., are carried into a wound, healing is delayed and atypical results may be expected. There are many reports of cancer of the skin following wounds of this character. No doubt many of these are coincidences, while others represent the combined result of injury and previous alteration of the skin. In all such cases one must inquire whether the patient has been exposed to tar, or petroleum products, or has had a course of arsenic therapy, or suffers from multiple keratoses.

2.—*The previous integrity of the wounded part.*

While courts and juries may accept the patient's statement that the injured tissue was previously entirely normal, the positive demonstration that a tumor is of traumatic origin requires proof rather than assumption. Most patients who develop cancer assert rightly that they had been in excellent health. The majority of cancer patients connect the beginning of trouble with trivial incidents, the most satisfying of which is an injury. Very often the occurrence of

an injury, mild or temporarily disabling, combined with the recognition of a serious disease, with doctor's visits, interrupts the patient's routine, and enables him to state truthfully that he "was well before the accident and continuously sick thereafter." Usually the only proof of previous integrity is the evidence of competent medical examination. Adherence to this criterion would exclude many of the cases of supposed traumatic cancer.

The incidence of cancer is sufficiently high to justify the pathologist in conceiving of normal tissues, not as normal but as harboring a great variety of structural abnormalities, tissue rests, precancerous lesions and even miniature cancers. Moore finds that the prostate in 16 per cent of subjects between 20 and 90 years of age shows miniature cancers, while between 45 and 90 years the proportion is 29 per cent. The presence of marked cystic disease in one breast raises a presumption that a cancer in the other breast arose on a basis of cystic disease. Many cases of supposed traumatic sarcoma of bones are rejected when an immediate radiograph shows that a tumor was well established at the time of the injury. The presence of multiple small tumors in elderly subjects seems to increase in direct proportion to the industry of the pathologist in searching for them. So strong is the evidence against the purely traumatic origin of most cancers that one must assume the attitude that a supposed traumatic cancer arises not in normal but in previously altered tissues. Trauma reveals more malignant tumors than it causes.

Traumatic determinism.

The presence of an unsuspected tumor tends to bring about the occurrence of injuries at the tumor bearing area and to intensify the subjective symptoms and local effects of injury. This principle may be designated as traumatic determinism.

A man is found at the bottom of a stairs unconscious and with a hematoma of the scalp. He recovers but complains of headache and attacks of vertigo. After three months, the symptoms persisting, an operation dis-

closes a slowly growing glioma of the brain, exactly beneath the hematoma. It then transpires that he had suffered from attacks of vertigo for some months before the accident. In one of these he became unconscious and fell down stairs.

A carpenter slipped down a ladder and bruised his shin. Pain continuing, two weeks later a radiograph showed a sclerosing osteogenic sarcoma occupying the upper end of the tibia. The leg was immediately amputated, but pulmonary metastases had occurred and proved fatal. It was then attested that he had been noticed to limp and spare the limb for some weeks before the accident. It is evident that the tumor antedated the accident and interfered with the normal mobility of the knee joint.

A young woman fell down the subway steps and injured her knee cap. She continued working as usual for two months when pain set in and she was treated for traumatic arthritis for two months. Radiographs then disclosed a large tumor of the lower end of femur, many small cysts in the patella, several cysts in the upper ends of both femora, pubes, and lumbar vertebrae and pronounced scoliosis of the dorsal spine. The leg was amputated and a benign giant cell tumor occupying much of both condyles was found. The structure was fibrous, and therefore, of slow growth. Here the tumor of the femur antedated the accident, and the general signs of osteitis fibrosa cystica showed that she was suffering from Recklinghausen's disease with complicating giant cell tumor. The marked disease in both patella and femur satisfactorily accounts for the accident which occurred, without other adequate explanation.

With cancer of breast, tumors of testis, cancer of sigmoid, neurofibromas of superficial nerve trunks, and many others, the local conditions produced by the tumor include increase in bulk, fixation in the organ, adherence to skin and deep structures and often some inflammatory reaction. All these conditions tend to convert many simple blows, pressures, stretchings, etc., into forces capable of injuring the tissues with pain and hemorrhage, whereas in normal tissues the effects would have been nil. It is in this manner that injury usually brings to light unsuspected tumors. Whenever an apparently trivial injury is said to have produced some peculiar and exaggerated effect, and a tumor is later discovered, it should raise the suspicion that the tumor antedated the injury.

3.—*The tumor must arise at the point of the injury.*

Any reasonable theory of the traumatic origin of a tumor must assume that the tumor develops in tissues actually altered in structure by the trauma and not from some mild transmitted force leading to intangible nutritional disturbances of which we know nothing. Such alteration in structure can only be produced at the exact point of the injury or within narrow limits. A blow on the knee cannot be assumed to be connected with a tumor arising in the hip, and an injury of the nipple cannot be responsible for a cancer arising in the upper outer quadrant of the breast. Lesions limited to the skin may not necessarily affect tissues deep beneath the skin.

On the other hand, there may be severe injury to deep organs without obvious damage to the skin, but the extent to which such deep effects may be expected will depend on many circumstances and becomes a matter of careful clinical judgment. In skull injuries the principle of contrecoup is of importance but difficult to evaluate. I have not found evidence that injuries to the cranium have been connected with epithelial tumors of the sinuses or nares.

Without obvious damage to the skin serious injuries may be produced in abdominal organs, such as rupture of liver, spleen and stomach. This result may be referred to the mobility of the abdominal skin and the fixation of liver and spleen. Much less frequently a movable organ as the stomach and intestine may be injured without obvious injury to the skin. When both skin and deeper injured tissue are fixed, the assumption that the deep tissue alone may be damaged must be regarded with much caution.

When the body falls from a considerable height and is subjected to general mechanical violence, the way is open for the assumption that a tumor in any organ may result, but unless there are definite symptoms pointing to injury of the organ there is no ground for such an assumption. It is difficult to conceive how a general concussion of the body can give rise to a malignant tumor at a particular point in which no structural damage can be demonstrated.

4.—*A reasonable time limit must be observed between the injury and the appearance of the tumor.*

It is difficult to establish any definite limits within which a tumor may reasonably be ascribed to trauma. Presumably the malignant process may represent a part of the original but generally somewhat delayed healing reaction, and thus appear within a few weeks. With very rare exceptions there is an interval of three to four weeks or more, before there is any definite sign of a tumor. According to Sauerbruch the interval for sarcoma should not be under three weeks, while for carcinoma, it may be as long as ten or twenty years. The absence of such an interval strongly indicates that the tumor antedated the injury. Some of the acute traumatic bone sarcomas appear very soon after injury, but nearly always after a certain interval. I have seen several cases regarded as sarcoma within two weeks after injury, but which proved to be myositis ossificans or benign exuberant callus. The histological structure of injured tissues following football injuries is notoriously difficult to distinguish from sarcoma and many limbs have been unnecessarily amputated for this reason.

The type of the tumor often decides whether it could possibly have grown in the particular time period. Again, the malignant process may be presumed to result at a late period, months or years, after the injury, from the disturbance caused by scarring and interference with function and nutrition. Yet the passage of time allows the entrance of many other factors into the causation, so that the longer the interval the less certainly may the tumor be referred to trauma. Here again the type of the tumor is often of decisive importance.

Continuity of Symptoms.

The so-called bridging symptoms, between the injury and the appearance of the tumor are of interest and occasionally of importance. When the evidence shows that a wound of an apparently normal tissue never healed, that pain, swell-

ing and discharge persisted for weeks and until the definite appearance of a malignant process, then one must accept a presumption in favor of the traumatic origin, and rely upon other features if the traumatic theory is to be rejected. Yet when dealing with tumors of the internal organs I have not found that bridging symptoms are of real significance, because it is well known that the first symptoms of cancer of the stomach, lung, etc., frequently appear suddenly and that they are invariably referred by the patient to some incident, often trivial, and almost always to injury if trauma of any sort has occurred within the memory of the patient. These considerations apply also to the question of aggravation. Several German authors have pointed out the unreliability of bridging symptoms. When an unsuspected tumor is injured the symptoms are apt to be out of proportion to the injury and to continue until the presence of the tumor is recognized, whereas when normal tissues are injured they generally heal normally and a symptomless interval separates the injury from the signs of tumor.

5.—*The positive diagnosis of the presence and nature of the tumor is essential.*

This criterion will be obvious to all who are familiar with the uncertainties of the clinical diagnosis of tumors. Troell reviewed 105 cases registered as bone sarcoma in the Stockholm hospitals, and found that one in four was not sarcoma. The complete modern diagnosis of structure, grade of malignancy, origin and probable course of malignant tumors furnishes information essential in medico-legal interpretations. Biopsies and autopsies should therefore be made mandatory. Microscopic examination often reveals that a supposed primary tumor is tuberculosis, or syphilis, or lymphogranuloma or some form of metastatic carcinoma. It may show that the tumor is a slowly growing process which antedated the injury. Histogenetic diagnosis should replace the simple histological report, for there is a wide difference in the medico-legal relations of spindle cell osteogenic sarcoma and neurogenic sarcoma, between lym-

phosarcoma, lymphoepithelioma, and round cell carcinoma, and between many other varieties of tumors, but these important distinctions are seldom recognized in current medico-legal reports.

The tumor must be of a type which can reasonably be referred to trauma and which is consistent with all the facts in the case. Judgments in this field must be based on a broad knowledge of the causes, natural history, and structural features of the different forms of tumors.

To be the result of injury a tumor must be of a type which can be referred to disordered processes of regeneration in any injured tissue. One cannot refer a cancer in bone to bone injury, because there is no possible source of such a tumor in bone. Yet adamantinoma of the tibia, etc., has sometimes been traced to the traumatic transfer of a fragment of epidermis and epidermal glands into the underlying bone.

The traumatic theory is applied with difficulty to the entire group of tumors arising from tissue rests. There has never been any evidence adduced to show that these rests are incited to growth by local injury, although Ribbert was willing to consider such a possibility. Accordingly, one must exclude from the field of trauma such tumors as adrenal rest and other peculiar tumors of the kidney, mixed tumors of the salivary glands in various locations, bronchogenic carcinoma of neck, myoma uteri, aberrant thyroid tumors, myomas and myosarcoma of the gastro-intestinal tract, and the entire group of complex tumors of the cephalic and caudal extremities of children.

Likewise local teratoids, or mixed tumors, such as fibroadenoma of breast, and its variants, carcinoids of appendix, adamantinomas of jaw, and many complex neurogenic tumors must be excluded from the traumatic class. A highly embryonal cell character is very difficult to reconcile with an origin from trauma, and can reasonably be referred only to an embryonal character of the cells of origin.

A review of reports of alleged traumatic tumors in several languages leaves the impression that legal medicine is struggling along in many countries with very meagre aid from exact tumor pathology. Industrial surgeons and most pathologists are not much concerned with the relation between tumor structure, histogenesis, rate of growth and possible behavior of neoplasms. Many cases, obscure in all other respects, could be readily decided by reference to this source of decisive information.

Thus, two well-known authors, in an otherwise astute contribution, report some of their cases as "sarcoma" and "carcinoma." They ask one to believe that an epidermoid carcinoma can arise and destroy the whole body of the mandible for two inches and extensively invade the cervical nodes in $3\frac{1}{2}$ months.

Aggravation.

The theory of aggravation of an existing tumor has assumed much importance in compensation courts. The object of the law granting awards for aggravation of a tumor seems reasonable if the course of the disease and its fatal termination are definitely hastened, or if trauma introduces into the course of the malady features and complications, injurious to the well-being of the patient, which do not normally belong to the disease. It can hardly be assumed that the law intended to insure workers against the occurrence and natural symptoms of all malignant tumors which arise from causes not connected with industry.

One must consider, first what constitutes aggravation. An injury which hastens the death of the patient must be accepted as aggravation. Such results are seen when a trauma causes immediate hemorrhage, infection, and collapse in advanced cases of cancer of stomach, or other internal organs, or when a fracture is precipitated in a bone which is the seat of a sarcoma, with subsequent severe hemorrhage and infection. When, however, the

trauma merely leads, somewhat prematurely, to complications which are inevitable in the course of the disease and are about to occur in the normal course, it seems inequitable to assume that any aggravation has occurred. The normal course of the malady has not thereby been altered. The small hemorrhages of gastric and other internal cancers, the initial attacks of pain in sarcoma, the erosion of superficial ulcers, the infarction of bulky tumor masses, the sloughing of infected tumors, the sudden closure of hollow viscera, and many other events are natural features in the course of the diseases, are often the initial symptoms of the diseases, and cannot be regarded as aggravation. All these incidents are bound to occur in the ordinary environment of the patient, and they frequently appear when the patient is lying in bed, or walking up stairs, or straining at stool, or suffering from bad news. Unless the trauma introduces into the course of the disease, something which does not belong there and which works to the disadvantage of the patient, aggravation may not properly be assumed.

Trauma may cause temporary complications in the course of a tumor, the effects of which disappear in due time, and have no permanent influence on the total course of the disease. Thus a patient with unsuspected carcinoma of the lung, falls into a ditch and breaks his arm which heals after six weeks. He dies a year later from the carcinoma of lung which runs an average course. He should receive compensation for the fracture, but not for the carcinoma. A woman with generalized carcinoma of the breast with metastases in many bones is shaken up in a collision of a public conveyance, and has to remain in bed for a month, after which the malignant disease runs its natural course. Here there is no definite ground for assuming aggravation of the cancer.

When injury discloses the presence of a tumor and leads to earlier operation, which may be the best method of treatment, the chances of recovery are improved and aggravation may not be assumed.

It is generally assumed that trauma may activate a latent cancer and increase the growth energy of the cells, but the grounds for this view are unsatisfactory. It is very doubtful if any primary cancer is ever in a state of quiescence, although the early growth may be slow. The idea that trauma may endow the cells with greater powers of growth must be rejected. The growth energy of tumor cells is determined by the conditions of origin, although its manifestation may vary with the environment.

Lubarsch bruised fibroadenomas of the breast in rats and epitheliomas of the dog by repeated blows of a hammer and by crushing them with a forcep, but failed to find any increase in growth or number of mitoses. In some mice with two tumors the one traumatized regressed or remained stationary, while the other grew. As a rule he found that any marked disturbance of circulation was followed by regression.

Marsh subjected malignant tumors in mice to various severe injuries and found retardation of growth as often as acceleration. When large tumors were traumatized infection and sloughing sometimes followed with the earlier death of the animal, but with smaller tumors retardation was rather more prominent than any signs of acceleration.

There are several conditions in which severe trauma must be accepted as capable of accelerating growth and hastening death. (a)—When an encapsulated tumor suffers rupture of the capsule, pressure is relieved and the tumor may grow more rapidly for a time. Whether the injury thereby hastens the total course of the disease must be judged by the general clinical picture. (b)—When trauma introduces infection, especially in superficial tumors, the course of the disease may be hastened, owing to more active proliferation of tumor cells, and probably in some cases by favoring metastases, but whether such results have actually occurred must be determined by clinical judgment, by one who is familiar with the natural course of the disease. One not infrequently sees an increased number of mitoses in cells surrounding pus foci

in epidermoid carcinoma. (c)—In several thousand diagnostic punctures by needle and trocar, I have not seen any evidence of increased local growth or metastases. Surgeons have not been deterred from the universal practice of taking biopsies; by resections often of considerable size, because of any observed increase in growth of the tumor or danger of metastases.

Wood performed many biopsies on transplanted carcinomas of mice without observing any increase in growth. Rohdenburg collected a long series of cases in which a partial removal of a tumor was followed by regression of the remainder. On the other hand the curettage or partial removal of a bone sarcoma is very apt to be followed by prompt recurrence and more rapid growth and sometimes by a definite change in the structure of the tumor, but insults on such a scale rarely occur by accident. Accordingly, one must conclude that unless a tumor has received a severe crushing injury there is no definite danger of increased growth or metastases.

In general, opinions regarding aggravation must be based on broad clinical judgment and the observation of actual facts, rather than upon the pursuit of speculative possibilities.

Can trauma cause the appearance or localization of metastatic tumors.

It is surprising how many metastatic tumors are referred by the patients to some previous injury. This situation occurs so often as to suggest that the injury is in some way responsible for the metastases. It is well known that the lowered resistance and obstructed circulation of traumatized tissue may gather bacteria from the blood stream and lead to local abscesses. Burrows, in an elaborate investigation, has pointed out many interesting features of the localizing effects of injured and especially infected tissues, but he was unable to find any definite application of this doctrine in the field of cancer. Lubarsch failed entirely to

localize metastases in mice with inoculated tumors by fracturing the bones.

Jones and Rous placed kieselguhr, dead tumor cells, and glass rods in the peritoneum of many mice and found much greater tendency of injected tumor cells to become implanted in the regenerating tissue about the foreign material. Since regenerating fibroblasts are more active than resting fibroblasts in tissue culture they concluded that the regenerating tissue was more apt to provide the stroma necessary for the implantation. However, implantations were not infrequent in the control animals, and it is not clear that the conditions in the peritoneum are comparable to those of injured human tissues. The evidence drawn from many experiments with chicken sarcomas, reviewed by Foulds, shows that tumor cells may be localized by various types of injury, but also by almost any structural abnormality in the tissues.

It may be conceived that the damaged capillaries in a traumatized area may sift out vagrant tumor cells, which are able to grow in the devitalized area as do bacteria, and thus that metastases may develop which might not otherwise appear. In order that any such event should occur it is necessary that tumor cell emboli should frequently be present in the circulation. Such conditions exist only in the advanced stages of malignant tumors. The chances are overwhelmingly against a single or occasional or precocious embolus lodging in a traumatized focus. The assumption that tumor cells are constantly being discharged into the circulation is not supported by any definite evidence. Tumors probably vary in this respect and it is possible that some very malignant cellular growths release numerous cell groups even in their early stages. These cells must be sifted out by the lungs. Schmidt found some indications that tumor cell emboli may be destroyed in the lungs. If by some rare chance vagrant cells did lodge in such a traumatized area, there is some reason to conclude that the conditions for growth are somewhat better than in lung or bone marrow, where metastases usually appear. I

believe, therefore, that the possibility of the localization of metastases by trauma may not be excluded. However, trauma at a distance cannot dislodge the vagrant cells, and its influence would be limited to a particular localization of tumor cells which would probably produce a metastatic tumor somewhere in the body. Accordingly, one must conclude that if a trauma causes a localization of tumor cells with metastasis, this event can only occur in the late stages of the disease and at a period when the metastatic tumor cannot be regarded as influencing the course of the disease.

Experience confirms the validity of the above principles. A laborer, who claimed to be in good health fell into a ditch and fractured the humerus. The fracture healed slowly and after four months a rapidly growing tumor appeared about the callus and other tumors appeared in the skin of the chest, axilla, and finally were noted in the lungs. A diagnosis of traumatic osteogenic sarcoma was made, but after one year the body was exhumed and a large carcinoma of the lung was disclosed with metastases in many organs and particularly in the subcutaneous tissues of chest.

A woman struck her head against a closet door and a few weeks later a persistent swelling appeared in the pericranium and grew rapidly. Aspiration revealed a malignant adenocarcinoma. It then was found that she had had an operation for carcinoma of the thyroid gland two years previously.

A workman struck his head against a boat hook sustaining a mild bruise without bleeding and no attention was paid to the incident. Some weeks later a rapidly growing tumor appeared which proved to be a malignant adenocarcinoma. General radiographs disclosed a tumor of the kidney and many metastases in the ribs and pelvis.

A carpenter stated that he had bruised his chest against an alarm clock, but without any laceration or ecchymosis. A few weeks later a rapidly growing adenocarcinoma fungated through the bone and skin. Examination disclosed a large tumor of the kidney with many metastases in lungs and skeleton. In all these cases the metastatic tumor probably existed before the injury and in only the fracture case was the injury authentic or adequate.

The following case suggests the localization of metastases in tissues receiving hypodermic injections. In June, 1933, a physician came to the Memorial Hospital with an embryonal carcinoma of the testis and epigastric metastases. The abdominal mass disappeared under radiation, but in October, radiographs showed pulmonary metastases, which also disappeared under radiation. In November, he developed severe headache and hemiplegia, and he was given several hypodermic injections in the deltoid region. Under-

radiation he recovered from the hemiplegia and was able to return to his home, but died in December with another cerebral attack. Two weeks after the injections a nodular swelling developed in the subcutaneous tissue in the area of the injections. Autopsy disclosed tumor masses only in the brain and in the deltoid region, showing the structure of the testicular growth.

Trauma as a precipitating factor in the causation of cancer.

The great rarity of authentic cases of traumatic cancer, the uniform failure to produce the disease experimentally by simple trauma, and the highly specific nature of known cancerogenic agents, have led pathologists to conclude that a single trauma is itself incapable of producing a malignant tumor, and that it must always act in combination with equally or more important factors. What are these associated factors?

In mice rendered highly susceptible by selective breeding, Slye noted the frequent incidence of cancer after trauma, but no such conditions of susceptibility exist with man.

The incidence of tumors of the breast, nerve trunks and bones reveals a certain hereditary tendency. While an exalted state of hereditary predisposition may theoretically render these organs more susceptible to traumatic cancer and sarcoma, I have never been able to detect any such influence in medico-legal cases. With chicken sarcoma the exciting or growth agent unites by a special affinity with muscle tissues (Murphy) and when the muscle is traumatized a tumor develops at the injured point. But in human pathology there is no known parallel with chicken sarcoma. When the heavily tarred skin of rabbits is scarified multiple tumor nodules may appear after a variable interval in the scarified lines. Apparently the trauma precipitates the development of cancer in tissues which are on the point of yielding them spontaneously.

To a considerable extent the application of this doctrine is exemplified in the human subject, since it is well known that injuries of many kinds, especially if repeated, cause the appearance of cancer in x-ray dermatitis, or in scars of

heat burns, or in simple chronic ulcers. It seems reasonable to conclude that in this field one finds the real explanation of many apparently traumatic cancers, which arise in tissues long prepared by some previous injury or irritation, with or without recognizable precancerous changes. In the case of anilin cancer of the bladder the exposure may have occurred many years before. Since in all such conditions the occurrence of cancer is very frequent, the question arises whether the cancer is chiefly due to the injury or is merely the natural expression of the original disease. The decision becomes a matter of careful clinical judgment, and in certain cases the trauma will be accepted as the precipitating cause. Such conditions call for the recognition by the Courts of a form of partial liability.

It is widely assumed that trauma may hasten the progress of various precancerous lesions, such as chronic mastitis, keratoses, benign tumors. Such a theory is possibly correct, but the fact that trauma has actually produced such a change in any given case must be established by clinical evidence, and is extremely difficult to prove. The natural tendency of such lesions is toward cancer, and clinical observation shows that the vast majority of such injuries to precancerous lesions heal as do normal tissues, while some may actually interfere with the further progress of the lesion.

One occasionally notes, especially in German literature, the policy of assuming that while a trauma has not originated the cancer, it has acted upon a slumbering tumor anlage, and caused it to become an active carcinoma. This policy avails itself of several unwarranted assumptions. (1)—What is the tumor anlage? If it is a precancerous lesion or a tissue rest there can be no evidence that such things existed at the injured point. (2)—If such abnormalities exist, we have no evidence that trauma does cause them to change their course and become cancerous. (3)—If the anlage is a miniature cancer, there can be no proof that it exists or that the trauma accelerates the growth. On the contrary, the observations of Lubarsch

and Marsh show that even with established cancers, trauma is just as likely to interfere with the growth as to accelerate it. In all such cases it is impossible to establish a reasonable probability, by a series of assumptions, and it is far more reasonable to look for the ordinary known causes of the cancer.

CONSIDERATION OF SPECIAL TUMOR TYPES

Neurofibroma is a manifestation of Recklinghausen's disease. This remarkable dyscrasia, in all its phases, may be traced back to an hereditary and congenital disturbance in the fetal ectoderm affecting mainly the skin and nervous system. When one reviews the various disorders attributable to neurofibromatosis, notes the occasional occurrence of tumors and observes how uniformly the tumors are associated with other features of the dyscrasia, the conclusion must be reached that trauma can play a very minor part, if any, and that the course of the malady is determined by intrinsic factors.

Experimental studies covering a vast number of experiments in cutting, suturing and transplanting nerves reveals a very moderate regenerative capacity of nerve tissue, always self-limited.

Clinical experience reviews the innumerable lacerations, fractures, amputations, nerve sutures, infections, to which nerves are exposed and can point only to the low grade amputation neuroma as evidence of neoplastic tendency.

Dupuytren's contraction, or rider's hand, is a neurofibroma, but results from repeated blows and stretching. Desmoid tumors probably include a neural element, but here again continued stretching enters. The literature contains few references to traumatic neurofibroma. In several cases in which the patient has attributed the tumor to injury, I have been unable to substantiate the claim, but occasionally the history is difficult to analyze. The fact that neurosarcomas recur repeatedly after operations (in one case 21) while retaining the original structure un-

changed, renders aggravation extremely improbable. Rather frequently injury brings to light an unsuspected neurofibroma.

Lipoma and Liposarcoma.

According to Toldt, fat tissue develops from isolated embryonal fat anlage or organs, each with an independent system of blood vessels in the meshes of which the fat tissue forms by infiltration of perivascular cells. The common lipoma illustrates this mode of origin by producing a multi-lobed tumor mass which is so isolated from the surrounding fat tissue as to suggest a separate blood supply. It is difficult to conceive how trauma can provide such a separate set of blood vessels. All that trauma may do is to disarrange the pre-existing blood vessels and allow the growth of separate individual fat cells. These effects are constantly seen in the regeneration of injured fat tissue, with the production of oil cysts and the proliferation of fat cells about them and foreign body giant cells, yielding the picture of traumatic fat necrosis.

The spontaneous appearance, multiplicity, symmetrical distribution, frequent admixture with angioma and neuroma, and striking association with hereditary neurofibromatosis, all compel one to assign the origin of lipoma to congenital or acquired disturbances of structure of the affected tissues, and nutritional abnormalities.

Nevertheless, the literature contains many references to alleged traumatic lipomas in a few of which the sequence of events is suggestive of a traumatic origin. Wolff reports one case following a single trauma, and adds three others referred to multiple injuries about the shoulder. Lieschke's collection of 81 cases includes a miscellaneous clinical material in which there is no evidence of any special effort to scrutinize the facts. With the same facility Bosse and Lieschke referred several cases of scrotal lipoma to contusions. On the other hand Wurz found only one of twenty-eight cases in which a traumatic origin could be

considered. Stern considered the general pathology and clinical features of lipoma and rejected the traumatic theory entirely.

That repeated traumas may induce the growth of certain peculiar types of lipoma such as lipoma arborescens of the knee joint, or lipomas about old inguinal and ventral hernias, etc., is suggested by more direct and acceptable evidence. The rupture of joint capsules or intermuscular fasciae may allow the hernial protrusion of fat lobules, which by repeated impacts, venous congestion, and gradual traction, may induce a low grade of neoplastic growth. It is probably through such indirect effects that any lipomas actually attributable to trauma must be explained.

Since fat tissue may react to injury by active proliferation of fat cells the basis is laid for the development of liposarcoma after trauma. Clinical experience indicates that in rare cases, crushing injuries involving fat tissue may result in certain forms of liposarcoma. In these cases the previous integrity of the tissue may be a reasonable assumption, the adequacy of the trauma is attested by its severity, and the continuity of symptoms connects the tumor directly with the tissue damage, so that little ground may remain for rejecting the traumatic theory of origin.

An intelligent woman stated that she was in the habit of striking her thigh against a projecting bureau while passing through her apartment. After some weeks a persistent lump formed at that point, and after successive blows the lump enlarged to the size of an egg. In the sixth month it was excised and the tissue showed an active diffuse growth of atypical fat cells with distinctly sarcomatous features.

In the writer's experience it is the adult type of liposarcoma with opaque granular spindle and polyhedral cells which seems to follow trauma. The embryonal type of myxoliposarcoma or pure myxosarcoma, commonly occurring in the groin, is of embryonal origin, and in the writer's material, has not been preceded by trauma.

Bone tumors.

The reactions of bone tissue to injury, fracture, and other severe traumas give evidence favorable to the theory that severe trauma may be the essential cause of certain benign and malignant tumors of bone.

Starting with this broad assumption it becomes necessary to determine what are the reactions to injury which suggest a relation to sarcoma and what are the types of bone sarcoma which may possibly be referred to trauma.

After fracture, especially when imperfectly immobilized, there may be excessive callus formation yielding a tumor-like swelling clinically resembling sarcoma. In a case of fracture of the clavicle a tumor mass 5 cm. formed in 18 days, which was resected as sarcoma. It showed very active growth of practically normal bone arising chiefly from muscle tissue and some islands of atypical cartilaginous callus. In myositis ossificans the reactions are usually those of excessive production of normal bone with much atypical cartilage. Yet in some cases the reaction may show a very cellular tissue resembling sarcoma with atypical bone and very atypical cartilage such as are seen in some osteogenic sarcomas. It is a notorious fact that many limbs have been amputated for sarcoma because the tissue strongly resembled osteogenic sarcoma. In one case the tissue removed four weeks after a football injury was passed as sarcoma by five pathologists in different parts of this country, but the case ran the usual favorable course of myositis ossificans. It is thus apparent that the reaction of bone to injury often approaches the character of osteogenic sarcoma, especially those types which form bone and cartilage. What factors turn the balance into a true malignant sarcoma are not known.

That some entirely new factors, not connected essentially with the injury, do enter into the case when a true sarcoma results, is strongly indicated by the vast number of fractures, operations on bone, bone grafts, etc., which never develop sarcoma. Special injury to blood vessels or muscle

may be excluded because the apparent traumatic sarcomas do not usually involve muscle or produce extensive hematomas. One is thus forced to resort to the theory of local predisposition, about which nothing definite can be said.

A more substantial explanation is that there has been a pre-existing silent tumor focus which is brought to light by the injury. Immediate radiographs have often disclosed the presence of such a pre-existing tumor. If the practice of taking radiographs immediately after bone injuries were universal, I believe the majority of alleged traumatic bone sarcomas would be eliminated.

In the general etiology of bone sarcoma there are many facts which tell against the traumatic theory. The disease belongs to young subjects or young adults, indicating that it is due to some disturbance of growth resulting from intrinsic factors. Chondromas are often multiple and hereditary and occasionally osteogenic sarcoma appears in several bones. Bone changes are common in scurvy and rickets and those in rickets are certainly connected with some of the medullary chondro and osteosarcomas. There are many other forms of nutritional disturbance in bone which may well form the basis of tumors. About 8 per cent of cases of Paget's disease in adults develop osteosarcoma (Codman) and nearly all cases of osteosarcoma in elderly adults arise on this basis. Osteitis fibrosa is common in young subjects, and it may well be regarded as a probable basis for sarcoma in early periods of life. In many cases of osteogenic sarcoma the bone marrow shows changes of the same general type as in osteitis fibrosa. There have been some reports of traumatic osteitis fibrosa cystica, but this disease must now be attributed mainly to disturbances in calcium metabolism.

Infection probably plays a definite role in some cases. Primary abnormalities in the blood vessels are probably related to the telangiectatic types of bone tumors. Clinical experience shows that the great majority of osteogenic sarcomas arise without any traumatic implication, and that

the vast majority of bone injuries heal normally. Therefore, when sarcoma of bone follows trauma there is a strong presumption that the disease is not caused by the trauma but results from one or more of the above conditions which are positively known to produce it.

What types of malignant bone tumors may be considered as possibly traumatic?

The character of the reaction of bone tissue to injury indicates that only the bone formers and their variants may safely be referred to trauma. Atypical exuberant cartilaginous callus and atypical bone trabecula are prominent in this reaction and these elements belong chiefly to that group designated by the American Registry as medullary and subperiosteal sarcoma. Formerly this group was termed simply "periosteal sarcoma," but it has now been subdivided.

The bone forming tumors are composed of large polyhedral and large spindle cells and occasionally mononuclear tumor giant cells, and much or little atypical poorly formed cartilage and bone. The recognition of the possible variants of this group is the task of an experienced tumor pathologist.

The true periosteal sarcomas are composed of small spindle cells and seldom or never contain any trace of bone or callus. They presumably arise from the outer layers of the periosteum. In the writer's experience the few cases of osteogenic sarcoma which seemed probably of traumatic origin have been of the bone forming type.

A boy of 18 years carrying a heavy sack of mail over freshly broken stone fell and suffered a contused and lacerated wound over the middle two-thirds of the tibia with some bleeding. The limb remained painful for two months, swelling was noted in the third month and a radiograph after the fourth month revealed irregular nodular thickenings over the injured area. In the amputated limb the anterior portion of the shaft of the tibia over a segment six inches long was the seat of a cellular sarcoma with much atypical cartilaginous callus and poorly formed bone.

A boy of 14 years playing basket ball received a severe blow above the inner femoral condyle. There was severe pain and immediate swelling and discoloration of the skin and he was helped home and put to bed. After two weeks the swelling had partly subsided, but then remained stationary, increasing slowly after the fourth week. In the eighth week a radiograph disclosed a destructive process affecting 2 inches of the shaft and contiguous medulla with a marked painful tumor of the soft parts. Roentgen therapy produced only slight temporary relief and the leg was amputated in the fourth month, but death followed from pulmonary metastases. The tumor was a very vascular and cellular subperiosteal and medullary bone forming sarcoma.

To what extent the acceptable cases of traumatic bone sarcoma in the literature follow this type cannot be determined because the structural types are not usually reported. At present the writer's cases are too few to permit the assertion that all traumatic bone sarcomas must necessarily be of the bone forming type. Sebestyen reported three cases of bone sarcoma following shortly after war injuries, all of which were bone formers. The medullary osteosarcomas, chondrosarcomas and myxomas find their best explanation in congenital or acquired abnormalities in the structure of the bone. The tissue of origin of these tumors is well protected from injury. In endothelioma of bone I am disposed to discount the occasional history of trauma because the structure indicates an origin from structural anomalies in the fine blood vessels of bone and bone marrow. The subjects are usually of delicate constitution and the vast majority of cases give no history of injury. The various types of myeloma must be referred to infectious and nutritional disorders. Liposarcoma is a medullary tumor of obscure etiology.

The recent demonstration that giant cell tumors are essentially a phase of Recklinghausen's disease, osteitis fibrosa cystica, that this disease is often associated with tumors or functional disturbances in the parathyroid glands with excessive mobilization of calcium, that the disease may be cured by extirpation of the parathyroid tumor, and produced in its main features by administration of parathormone, leaves little basis for the traumatic theory of origin of these common lesions. (Barr, Bulger,

Lit.) (Jaffe, Bodansky). In some cases the giant cell tumors have appeared in nearly every bone in the body. In many others they have appeared in one bone at one time and later in other bones. Efforts to produce giant cell tumors by inducing traumatic hemorrhage have failed. Teichmann introduced magnesium needles into the marrow in dogs, producing cavities which, after the resorption of the magnesium, were filled with normal marrow tissue. He concluded that trauma alone is insufficient to produce bone cysts. A primary absorption of bone trabecula by calcium withdrawal with a peculiar and specific reactive process not seen after pure trauma seems to be the regular sequence of events in the origin of these tumors. If giant cell tumors result from trauma they should show definite evidence of organizing blood clot or chronic inflammation in fat tissue, but these signs are generally missing in such tumors and when present seem to be secondary changes. In view of these considerations, any history pointing to the traumatic origin of a giant cell tumor must be scrutinized with the greatest care.

Chordoma.

Ardoine concludes a report of miscellaneous cases of supposed traumatic tumors by relating four cases of chordoma in which he was able to obtain a history of trauma. In his case No. 2 the trauma as described was adequate, since the patient fell a distance of 2 meters striking on the sacrum with severe pain and urinary disturbance lasting two weeks. Ten months later painful micturition appeared and a tumor gradually developed over the whole posterior surface of the sacrum. In the other cases the nature of the trauma is not clearly stated. It does not appear that the author paid due attention to the natural history, known conditions of origin, and long latent period of chordoma. There were no data on the previous condition of the patient. Stanton reports two similar cases, in one of which the man sat down hard on the coccyx two years before, and in the other the patient remembered a blow on the head four years before.

Cancer of skin.

Cancer has often followed wounds of the skin, but with rare exceptions the connection between the trauma and the cancer is indirect. The types of wounds followed by cancer of the skin are nearly always complicated, the long interval of several years permits other factors to enter, so that it is difficult to determine whether the cancer is chiefly referable to the injury or mainly and essentially to the subsequent and complicating events.

Lacerated wounds which become infected and heal slowly may leave large scars which in exposed situations are subjected to unusual irritations and under these circumstances cancer occasionally develops, usually after a long interval. The entrance of foreign bodies, such as fragments of wood, steel, earth, clothing, etc., delays healing and alters its course so that cancer may result. In rare instances this result is observed within a few months, and without complete healing of the wound. The connection is then rather direct.

Injury of underlying bone with chronic osteomyelitis has in some cases been complicated by cancer of the skin, usually after a long interval. Repeated wounds, the one acting upon the scar tissue of the other, appear to be the most common sequence of events in traumatic skin cancer. Wounds and infections of burn scars are well known to lead to cancer, but as a rule only in very old scars. Here the question arises whether the cancer is the result of the burn or is a wholly new process dependent upon the predisposing condition in the scar.

Carnett and Burton reported a much quoted case of traumatic cancer of the skin occurring in a boy of 22 years who received a lacerated wound of the fore-arm while playing baseball. The wound never healed but developed extensive suppuration. The process was a very anaplastic carcinoma not squamous and the date of its appearance was not determined. The patient died of pneumonia after a total duration of the carcinoma of 1½ years. Here the injury, the suppuration, and the various surgical procedures must be considered in the origin of the cancer.

Chemical burns, especially those by hot tar not infrequently lead to cancer, and Gunsett reports cases in which the cancer appeared within a few weeks after the burn. Schad reports two cases of gunshot wound of the face in which squamous carcinoma developed in less than six months.

Haagensen reports from the Memorial Hospital many cases illustrating the conditions under which cancer of the skin may follow trauma. In most of these the circumstances were attested with fair but not absolute certainty.

A fox bite on the back of hand in 1922 was followed by normal healing, but in 1927, there was scabbing and ulceration, and in 1929 basal cell cancer appeared. A horse bite on hand in 1901 left a scaly area which ulcerated in 1922 and then showed epithelioma. A dog bite in 1919 was cauterized but never healed, remaining crusted, and in 1923 squamous carcinoma appeared. In three cases splinters of steel or wood entered the wound and cancer was found after 7 weeks and one year. A severe blow by a hammer with crushing wound was found to show cancer after one year. A horse tramped on a man's great toe in 1914 leaving a chronic suppurating sore which in 1919 showed cancer.

The familiar traumatic epidermoid cyst results from the transfer of a fragment of epidermis into the derma or deeper tissues. It is generally benign but many become malignant. A similar origin accounts for most, if not all, the tibial adamantinomas which appear within a few months (Fisher) or several years after an injury to the shin (Ryrie) (Holden, Gray, Lit.).

While there is no satisfactory evidence that normal scars are specially prone to cancer, it is clear that such scars are more prone to subsequent injuries and to infection. A very long interval permits the entrance of many new accidents and the appearance of late arsenic or sunlight cancer which might be effective on normal skin. The wounded area may not be regarded as immune to subsequent cancer producing agents. Therefore, the possibility that the late cancer is merely a coincidence must be considered. Since infection and delayed healing belong to complicated wounds, if healing is never complete and bridging symp-

toms persist and the cancer appears within a few weeks or months, the connection is more direct.

Reviewing the above data it appears that cancer of the skin may be regarded as traumatic only when it develops before healing is complete. When the wound heals normally and remains healed for a substantial period any subsequent development of cancer must be attributed to subsequent events. Otherwise a man who once sustains a wound of the skin would enjoy insurance against all later cancer producing hazards affecting that area, and for the rest of his life. Some form of partial liability would seem to be required for such cases.

Melanoma.

The dramatic incident of immediate local recurrence and metastases of apparently benign moles after surgical excision or destruction by nonsurgical methods forms the basis of the wide impression that a single trauma may transform a benign mole into a malignant melanoma. A careful scrutiny of the evidence in such cases does not support this view, but indicates that in all such cases the mole is already malignant. The good results obtained by dermatologists with thousands of moles shows that when the mole is benign excision or local destruction is a safe procedure. Experience at the Memorial Hospital shows that when a patient requests the removal of a mole it is nearly always because the mole shows signs of growth and when removed it is, with very rare exceptions, already malignant, and requires careful and wide excision. The clinical history of nearly all malignant melanomas indicates that the causes of malignancy reside in the original structure and tendencies of the mole and are not connected with trauma, except in very rare cases. This principle holds particularly with melanomas of mucous membranes and internal organs. For the same reasons when a long standing mole on an exposed position becomes malignant the presumption should be that the change results from inherent tendencies and not from the effects of a single

trauma. The majority of such moles never become malignant. Evidence is beginning to appear that the growth tendencies of moles are controlled by the sympathetic system and by means of internal secretions.

In the case of complicated wounds and repeated trauma the conditions are radically different and it would appear that melanoma may result from both these types of injuries and either from pre-existing moles or even in normal tissues, in subjects with local or general predisposition. The rarity of such cases indicates that the predisposition is uncommon.

Schopper collected from the literature and his own experience 25 cases in which subungual melanoma followed severe injuries with infection, or avulsion of the nail, and a variable period of chronic inflammation. He thought a naevus need not precede the melanoma.

Reviewing these cases I find it difficult to determine just what part was played by the injury. In one case the patient split the entire length of the thumb nail by an apparently mild blunt injury. The split remained unhealed for five months when slowly progressive growth of tissue appeared, with ulceration and later melanoma. This patient's hands were daily exposed to quicklime and the unusual result of the slight initial injury suggests some previous pathological condition in the nail bed. In another case the patient ran a splinter under the nail, the wound never healed, and 1½ years later melanoma was recognized. This brief report relates only to those facts favoring a traumatic origin. Schopper refers to many spontaneous subungual moles and melanomas with much the same history as the traumatic cases, reported by Heller and by Rockcock. He concludes that trauma alone is incapable of producing subungual melanoma, but that infection must be added. In a series of cases of subungual melanoma, Adair and Pack were not impressed with the importance of trauma, and nearly all their cases presented themselves because of definite signs of an active process without trauma.

I have an impression that many of the very malignant carcinomas of the skin following repeated trauma or complicated wounds are melanomas. A young baseball catcher repeatedly injured the thumb, developed a fissure which did not heal after two unsuccessful efforts at surgical removal over a period of six months and was found to have a cellular melanoma with metastases in cubital node.

A young girl suffered from excoriation of the skin of heel from a misfitting shoe. A horny wart developed after a few months which progressed rapidly, recurred promptly and produced general metastases. The structure was that of highly cellular slightly pigmented melanoma. An adult male allowed a projecting nail in his shoe to irritate the sole of his foot for several months. Soon there was pronounced pigmentation of the skin about the fine central punctured point extending superficially over a centimeter. The biopsy showed melanoma. The patient denied the previous existence of any mole and stated that the pigmentation appeared only after several weeks. It is said that the barefooted Sudanese natives frequently suffer from melanoma of the sole of foot after thorn pricks. (Dawson.)

Ocular melanoma.

The state of opinion regarding the traumatic origin of ocular melanoma is well reflected in the report of a case by Stieren and its subsequent discussion. In this case the patient received a lacerated wound of the conjunctiva and adjacent tissue which healed normally in two weeks. Nine years later he appeared with a small melanoma on the side distal to the injury, with detachment of the retina. In spite of the absence of any signs of definite injury to the eyeball, the unsatisfactory location of the tumor on the opposite side, the very long interval, the history of ocular disturbance for only six months, and the absence of any attempt to trace the possible mode of action of the trauma, it is stated that Segond's postulates are fully met and the case must be accepted as traumatic. This conclusion was vigorously rejected by Verhoeff who analyzed the case, pointed out the various deficiencies in the evidence, and reported that in the examination of over 300 cases of ocular melanoma he has never seen any evidence of trauma. Bancroft then followed with the usual clinical statistical report that of 126 cases of ocular melanoma 9 gave a history of trauma, but admits that the relation of trauma may have been merely incidental.

All the objections to the traumatic theory of cutaneous melanoma apply with added force to intraocular tumors. Ophthalmic literature would be much enriched by a single report of a case in which the known conditions of origin of melanoma are fully considered, the effects of an authentic and adequate trauma clearly stated, the probable relation of the trauma to the melanoma carefully traced, the time interval satisfactory, the gross anatomy and structure of the tumor shown to be consistent, and all the facts required for an adequate medico-legal opinion provided, and pointing beyond reasonable doubt to the traumatic origin of an ocular melanoma.

Glioma of the brain and cord.

The traumatic origin of glioma of the brain and cord has been extensively discussed for many years and opinions regarding its frequency and the mode of action of the injury have varied widely. Adler collected 1086 cases of glioma of the brain, of which 8.8 per cent were preceded by a rather definite history of trauma. The critical study of Parker and Kernohan showed that of 491 cases of glioma of the brain 4.8 per cent could be considered as possibly of traumatic origin, although 13.4 per cent gave a history of previous skull injury. Yet in an equal number of other patients 10.4 per cent gave a history of severe skull injury and of 200 normal persons 35.5 per cent gave a history of skull injury. They also followed 2858 war injuries of the skull for 14 years without finding a single brain tumor. Vogeler, Ackerman and others report 2775 cases of skull injuries followed for many years, finding a great variety of neurological sequels but no tumors. Since there are very few persons who have not at some time suffered a substantial injury to the skull, the history of such an injury at a distant date creates no assumption in favor of the traumatic origin of a tumor.

Beneke has argued strongly in favor of the frequent occurrence of traumatic brain tumors, relying especially on the doctrine of spastic contraction of the vessels as a cause of necrosis of tissue and later of gliomas. In

his experience 40 per cent of all gliomas give a history of severe or slight injury to the skull, raising a presumption that the tumor is the result of the trauma. Even slight injuries or even psychic trauma such as fright or sudden emotion must be accepted as causes of brain tumors. The pathogenesis of these traumatic tumors he conceives as follows:—At the point of the injury or at any distant point in the brain trauma may cause an arterial spasm. This spasm results in ischemic necrosis of brain tissue. On the edges of the necrotic area arises active proliferation of glia tissue becoming malignant through the action of the products of degeneration, necrose hormones of Caspary, mostly lipoid. By careful histological examination he claims to have been able to accurately identify the primary area of necrosis and the tumor process arising about it, and thus the scientific demonstration of the traumatic origin of the tumor has been furnished. In many instances he believes he has been able to determine the rate of growth and the duration of the tumor, and thus to establish the proper time relations between injury and tumor. The theory that gliomas arise from tissue rests or other congenital anomalies of structure he rejects as without foundation, since no one has ever seen such rests or anomalies.

This sensational doctrine did not long escape challenge. Within a few months Fischer-Wasels submitted Beneke's argument to a merciless analysis. He first asserts the wide scope of the embryonal origin of brain tumors, referring to Kornfeld's recent report on the frequency of tissue rests in the brain and meninges. He sharply denies the possibility of determining the age of necrotic foci or the age of tumors from histological data. He points out that skull injuries are so frequent that 99 per cent of all brain tumors would be attributed to trauma if Beneke's criteria were followed, and yet such tumors are exceedingly rare and did not increase in frequency after the war. Referring to Ricker's doctrine of arterial spasm following trauma he finds that severe trauma with unconsciousness may induce irritability and spasm, but as Ricker stated, never necrosis. In migraine and epilepsy there is severe arterial spasm but no necrosis. The idea that mild injury or psychic shock can produce necrosis he rejects as wholly lacking foundation. He points out that tumors never develop about anemic infarcts or other necrotic foci but only about old scars and after a long period of regeneration. Finally he cites a case in which a large glioma developed about scar tissue nine years after a gunshot wound of the brain, and he accepts the traumatic origin of such tumors arising under such circumstances, and as long as from one to twenty years after the injury, but not within one year.

One of the most significant features of this debate is the fact that in one of Beneke's cases, an experienced observer accepted without question the statements of the claimant which strongly favored a traumatic origin of the tumor, but that when the actual clinical facts were secured, a history of severe cerebral attacks before the accident was established and the traumatic origin was clearly excluded.

Accordingly, for brain tumors, one may not relax in any way the rigid criteria required to establish a traumatic origin. When it can be shown that the tissues of origin have been lacerated, and the tumor arises in the injured area, and after an interval sufficient to permit of regenerative processes, and the tumor is of ordinary gliomatous type or other suitable structure, then a traumatic origin may be entertained. Rare cases meeting these requirements have undoubtedly occurred and have been reported. It is especially in the scars of injuries that such tumors arise (Beneke, Fischer-Wasels, Reinhardt, Neuberger).

Cancer of breast.

It has long been known that mammary cancer never arises in a normal breast but always on the basis of previous anatomical alterations. These structural alterations take a great variety of forms, as chronic cystic mastitis, fibrous atrophic mastitis, simple fat atrophy, scars of old abscesses, displaced islands of gland tissue, atypical recurrent fibroadenomas, eczema of nipple, catarrhal inflammation of nipple and terminal ducts, tight nipple, papillomas of the ducts.

All these abnormalities adequately account for the occurrence of the vast majority of cases of mammary cancer, anatomically considered. However, since cancer often fails to develop on these lesions it has been necessary to determine some other exciting factors. One of these factors has long been recognized in the presence of stagnation of secretion in the cancerous focus and generally throughout the breast. The stagnation theory has received substantial support in recent years, from pathologists and clinicians. It has been shown, especially by Adair, that mammary cancer is much more frequent in childless women. In practically all cases of the ordinary forms of breast cancer I find stagnation of secretion in such relation to the cancer as to strongly suggest that the cancer arises as the result of local irritation of the altered secretions. Cheatle has shown in large sections of the breast the mode of origin of the lesion which obstructs the ducts.

In recent years experimental studies have thrown much light on the mode of origin of mammary cancer. Bagg produced mammary cancer in a high proportion of mice by removing the young at birth or by ligating the ducts on one side and allowing the young to suckle on the other side. Cancer developed in the non-nursing breasts, and on the ligated side only, and as a rule rather promptly. Bagg attributed the results to functional hyperactivity and stagnation. The factors of functional hyperactivity and stagnation have received impressive evidence from the work of Murray, Lacassagne, Little and others who have produced mammary cancer by implanting male mice with portions of ovarian tissue. In many cases the male breasts became hypertrophied, distended with secretion, and cancer resulted.

There is thus an extensive body of evidence showing that cancer of the breast develops under rather peculiar and specific conditions, readily demonstrable, and that in the absence of these conditions the disease does not appear. Therefore, in all alleged traumatic breast cancers search should be made for some of the above conditions and when they are found the conclusion that the disease depends upon these conditions and no others rests on a substantial basis. Moreover, the various efforts to produce cancer in lower animals by traumatizing the breast, as done by Lubarsch, Ribbert and others have uniformly failed. Marsh attempted to affect the incidence of spontaneous tumors of the breast in breeding female mice by mechanical injury of the breast tissue. Two series of 18 young breeders in each were used. One was injured on the right side only, the other on the left side only. The injury was continued regularly every three days, save for intermissions for recovery from the lesions, throughout the lives of the animals. Breeding was interfered with and the life period shortened to an average of nine months. The development of only three tumors where many were normally expected marks the experiment a failure (Personal communication).

Nevertheless, medico-legal practice meets a difficult problem in determining the influence of trauma in alleged cases of traumatic mammary cancer. When a woman states that she received a severe blow on the breast, followed by pain, swelling and discoloration with persistent symptoms for a period of weeks or months, with or without a symptomless interval, and when cancer later appears at the point of injury, the possible importance of the injury may be dismissed only after the careful application of all the criteria demanded to establish or exclude a traumatic origin. The inquiry, therefore, involves a laborious program of fact-finding.

The authenticity of the trauma may not rest on the mere statements of the patient, but should be corroborated by eyewitnesses and by signs of injury attested preferably by a physician. The trauma must be adequate to produce some structural alteration in the breast tissue and attended at least by hemorrhage. The innumerable mild blows which every woman's breasts sustain can hardly affect the breast tissue protected by a layer of fat one half to one inch thick.

The tumor must arise at the exact point of the injury since transmitted effects may be excluded in the average breast. The probability of coincidence is very great, and when a mild blow produces unusual pain the previous existence of a tumor should be suspected. Most cases of alleged traumatic breast cancer may be dismissed beyond a reasonable doubt when the cancer arises in a segment of breast which is the seat of old chronic fibrous or cystic mastitis or other predisposing anatomical lesions. There is no definite evidence to show that trauma to such lesions may precipitate a cancerous process. It is just as likely to be followed by cicatrization.

The only type of mammary cancer that can reasonably be referred to trauma is carcinoma simplex which might conceivably grow from ruptured ducts into scar tissue. Diffuse duct carcinoma, adenocarcinoma arising in cysts, embryonal cancers, carcinomatous fibroadenomas, inflammatory carcinomatosis, and Paget's disease, are not reasonably explained by trauma.

The time factor excludes many alleged cases. Scirrhous cancer does not appear within a few weeks. In the less malignant adenocarcinomas the lymph nodes are not usually involved within a year. Except in the more malignant types skin adherence does not occur for some months. There is always a period of some weeks or months when mammary cancer fails to give symptoms.

Therefore, in each case the entire clinical history must be secured and the tumor and the entire breast must be examined by a competent tumor pathologist before the basis can be laid for an opinion. When all these data are carefully gathered and analyzed, it has been the writer's experience that cases of mammary cancer in which a traumatic origin can be reasonably accepted are extremely rare.

At the present time the attitude of the general surgeon toward the traumatic origin of mammary cancer is very uncritical, and the task of fact finding is replaced by unwarranted assumption and speculation. That even experienced observers may fall victims of self deception is illustrated by the following case, originally reported by Rasch and cautiously interpreted by him as traumatic cancer, but later circulated as such in German periodicals.

A woman of 64 years, in March, 1929, suffered a punctured wound in the midsternal line by a wire which was wrapped around a small bunch of flowers. Three days later a physician found a reddish area about the wound .5 cm. wide. In the following weeks (exact dates not given), a reddish discoloration appeared in the skin of breast. (Exact location and extent?) Treatment by x-rays for three days was without effect. By September the patient had lost appetite and was much reduced in strength and the process had extended to the other breast and down to the navel. No definite tumor could be found either in the breast or in the skin. The axillary nodes became enlarged (date not given). Death occurred in June, 1930. Sections of the skin showed the characteristic highly malignant structure of diffuse duct carcinoma, which infiltrates the dermal lymphatics. The entire picture is typical of diffuse inflammatory duct carcinoma in which there is no localized tumor of the breast, but rapid dissemination through the skin with erysipeloid reaction. The wire puncture may possibly have added a local inflammatory element to a pre-existing diffuse carcinoma, but it could not possibly have originated the growth of the carcinoma because there is no breast tissue in the mid-line of the sternum. For the reader the deception is completed by placing over the puncture point a circle of white dressing fastened by four radiating lines of white rubber plaster, which rivets the eye and precludes further scrutiny of the case.

Carcinoma of the lung.

Clinical medicine assigns as etiological factors in carcinoma of the lung, tuberculosis, influenza, productive and interstitial pneumonias, exposure to irritating gases, including possibly petroleum products. The Schneeberg's miner's cancer may be due to radium rays. These diseases satisfactorily account for the observed cases and very few modern authors mention trauma. Adler found 6 among 384 cases with a record of previous trauma but the reports are not impressive and are of the usual clinical type. I would also reject the cases of Aufrecht and Curran. Lepine in 1903 gave a short but rather specific account of a case which may well have been of traumatic origin and which illustrates the conditions under which such an origin may be considered.

A man of 60 years, previous history not given, was struck on the 7-8" ribs in the posterior axillary line by a moving wagon, producing a prompt contusion. There was no hemoptysis and interval symptoms were lacking. One year later he appeared with signs of lung cancer which was soon fatal with gangrene. The autopsy disclosed a squamous cancer of the lung, mandarin size, opposite the point of injury and with pleura adherent to this point. There was a perforation of the chest between the 7-8" ribs and the pleura was concentrically thickened about the sinus.

I have investigated several alleged cases of traumatic lung cancer, but failed to find any definite indication of such a relation. Most of these tumors, as usual, were located at the root of the lung and in none was the tumor primary at the area of alleged trauma.

Gastric cancer.

The anatomical features of beginning gastric cancer and its general etiology are rather well known and they are incompatible with a traumatic origin.

Verse described twelve small unsuspected gastric cancers discovered at autopsy. They were single, occasionally multiple, slightly raised, circumscribed adenocarcinomas, generally infected, eroded or slightly ulcerated and .5 to 2 cm. in diameter. I have seen three such lesions. They represent about all that we positively know about the origin of the

ordinary form of this disease. In another rarer group the lesion first consists of a rather diffuse focal hypertrophy of lining cells with multiple superficial adenocarcinomatous areas tending to ulceration. This same diffuse process extending over a rather wide area may affect the chief cells of the glands giving rise to the superficial small cell variety of cancer. A few cases of gastric cancer arise from isolated islands of gastric mucosa lying in the mucosa or submucosa. Cardiac cancer probably results from a similar heterotopia of gastric or esophageal mucosa at the cardiac orifice.

Cramer summarizes the present statistical knowledge of the occurrence of gastric cancer with the conclusion that the disease is dependent on extrinsic factors connected with the dietary habits of the people. We have thus a very comprehensive body of evidence which fully accounts for the occurrence of gastric cancer apart from trauma.

It is, therefore, not surprising that the efforts of occasional authors to establish the traumatic origin of certain gastric cancers have not succeeded and have not received serious attention. Probably the most ambitious of these efforts was that of Menne in 1905. I have studied this contribution carefully on two occasions and failed to find in it any tangible evidence of a traumatic origin of his cases, or indeed, any competent effort to secure the facts in the cases. He endeavors to show that single trauma may directly originate gastric cancer, or may accelerate the growth of a pre-existing cancer, or "depleting the system" may hasten the course of the disease, to prove which he relies largely on speculation and assumption. In two of his most striking cases the traumatic origin was vigorously contested by competent pathologists.

Since it is well known that a severe non-penetrating wound may cause laceration of the gastric mucosa, it is necessary to consider under what conditions it may be assumed that such an injury has actually been sustained. Here the authenticity and adequacy of the injury must be properly attested. Persistent pain must result, and vomit-

ing of blood is very common. That such contused or lacerated wounds of the stomach have ever produced cancer has never been proven and is highly improbable.

An important observation by Luckow shows that trauma does not render the stomach immune to the ordinary form of cancer (Cit. by Knox).

In a man wounded by shrapnel in 1917, examined because of gastric pain in 1928, the x-ray showed splinters of metal in liver, gall bladder and greater curvature of stomach. Laparotomy disclosed an extensive gastric cancer, which had developed, not around the metal fragments in the greater curvature, but in the pylorus where such cancers usually arise.

Gastric ulcer.

Stern in a standard treatise on trauma enters fully into the relations of trauma to wounds, ulcers, and cancer of stomach and duodenum. From the extensive data presented it appears that severe blows to the epigastrium may cause lacerations of the mucosa and tears of the muscular coat, that such wounds, with rare exceptions heal promptly and without sequel, that they are nearly always accompanied by vomiting and usually hematemesis, that ulcers may form in a few days and heal either rapidly or slowly, that chronic ulcers may occasionally develop, in which case the form of the ulcer differs from the true peptic ulcer, showing adhesions, suggesting a primary rupture of the muscularis, that no case of typical chronic indurated peptic ulcer has been demonstrated after trauma, and that no case of traumatic ulcer has been demonstrated to run the course of ulcerocancer. In this whole discussion one finds much the same uncertainty regarding the facts as in the usual discussion of traumatic cancer.

The subject of gastric cancer he approaches cautiously and from a judicial standpoint, first pointing out that neither experts nor tribunals should or do adopt the theory, *In dubio semper pro laeso* (in doubt, always favor the injured). Yet when there exists a striking relation in time and location, between an injury and subsequent disease, the expert must not reject the probability of such a relation,

unless supported by attested pathological anatomical facts, experimental data, and extensive clinical experience. Yet after announcing this very sound doctrine, he proceeds to review the reports of two cases of gastric cancer and one of the sigmoid which he would accept as traumatic. In so doing, in the writer's opinion, he violates the principles previously adopted.

In the first case there were no symptoms of injury to the stomach, and the only evidence favoring trauma was the patient's statement that he was well before the injury and sick thereafter. A bulky tumor was discovered in six months and autopsy after 11 months disclosed an extensive carcinoma of the stomach without unusual features. In the second case symptoms of stomach injury were absent, and no injury was discovered at laparotomy. Yet the expert adopted the theory that while the injury did not originate the tumor it probably accelerated the growth of an existing minimal tumor anlage. The patient with sigmoid cancer received a kick in the abdomen, followed by vomiting and abdominal tenderness, especially in the left pelvic region which slowly disappeared. After three years the pain returned and after four years, operation disclosed a large sigmoid carcinoma without unusual features.

Tumors of the testis.

With rare exceptions malignant tumors of the testis arise at the rete testis and grow into and distend the body of the organ. They develop from sex cells, probably misplaced and more or less embryonal, which pursue an abortive course of fetal evolution, producing adult and embryonal organs, in the tissues of which a malignant process is commonly engrafted. The inception of the process is probably similar to that which excites the growth of the normal ovum, but without fertilization. There is no evidence that trauma can initiate such a peculiar process.

There is a rare adenocarcinoma of adult type, described by Bell, which arises in the body of the testis in adult subjects and grows slowly.

The adult teratomas grow slowly, requiring some months to reach a size which demands attention and continuing for two or three years unless interrupted by complications. The malignant carcinomas grow steadily and sometimes rapidly, generally with pain, and often with spontaneous

hemorrhage which need not be attributed to injury. A silent period of weeks or months precedes the detection of the tumor and is often masked by hydrocele. The shortest course of a malignant carcinoma of testis which I have been able to find was 18 weeks from the detection of a definite tumor mass until death from metastases.

The normal testicle escapes injury with remarkable facility from all except rapidly moving hard objects. When injured it always gives a peculiar testicular pain which readily runs into shock and the patient does not recover immediately. When the organ harbors a tumor it is easily injured and pain results from minor blows and simple pressure effects. Accordingly, many patients date the beginning of the disease from and assign the origin to trauma.

I have investigated many cases of alleged traumatic tumors of the testis without finding any acceptable. Most of the cases were rejected because the injury was simple muscular exertion with back strain, and the pain was referred to the back or groin. In others, the blow was directed to groin, or thigh, or pubes and not to testis, and testicular pain was absent. In several the size of the tumor and its structure showed that it must have antedated the injury, and in a few metastases were already present.

The literature contains many reports of supposed traumatic tumors of the testis, but most of them are without definite value. It is both affirmed and denied that the undescended testis is more subject to malignant growth, and the difference does not favor a traumatic origin of such tumors. Wasterlain gives a comprehensive review of the opinions of current authorities, all of whom are disposed to reject the traumatic origin except in very rare cases, in which the injury was fully attested and very severe.

He cites a case reported by Lippens:—A man of 50 years fell on a rail and received a severe contusion of the scrotum with ecchymosis extending to the groin, violent testicular pain with syncope, exquisite tenderness lasting several days and swelling of the testis. The swelling subsided for two weeks, remained stationary for four weeks when hydrocele appeared twice.

For twelve weeks the testis remained swollen and then enlarged nodes in the groin were found, followed by dissemination in seven months. The microscopic diagnosis was malignant tumor of the testis.

The experimental studies of Michalowsky are of much interest. He subjected both the testicles of the cock to many forms of severe trauma but in 100 birds never produced a tumor. However, when he injected chloride of zinc into the testes he secured 10 tumors in 50 birds, but only during the Spring. Bagg has verified these results. These experiments show that the testis of the cock is very insusceptible to malignant tumors following trauma, but very susceptible when the right irritant is employed. They tell strongly against the traumatic theory of origin of these tumors.

Hypernephroma.

Stern refers to two cases of hypernephroma as of traumatic origin.

The first case must be positively rejected because a large inoperable carcinoma of the kidney was found three months after a blow on the flank. Renal tumors do not grow so fast. The second case is of much interest and calls for critical examination. A man of 33 years, on the night of January 6, 1920, stumbled over some boards and struck the left side below the costal border against an iron object. There was severe transient pain. Next morning there were meteorism and colicky pains, and large masses of blood clot were passed in urine. After some weeks a similar attack. February 4, a radiograph showed the kidney of normal size and no stones. Thereafter occasional hematuria after lifting. May 22, 1922, severe back pains. A smooth oval tumor of the kidney, 980 gm. was then removed, the patient recovering. The tumor was partly adenoma, partly solid, with necrotic areas. (Whether renal or adrenal, not stated.) The possibility that this tumor was caused essentially by the injury must be admitted, but the probability rejected.

A traumatic origin involves resort to the hazardous and unproven theory that trauma may excite the growth of a silent tissue rest or miniature adenoma, from which these tumors are known to arise. The previous good health is of no moment. The details of the accident appear not to have been corroborated. The severe bleeding after an injury of no great severity suggests not a normal kidney but one

already the seat of a small tumor. The radiographer, looking for injury and stones might readily overlook a tumor. The period of two years represents a relatively short duration of such a large benign tumor. Such a series of uncertainties and assumptions is hardly sufficient to establish the traumatic origin of any form of hypernephroma.

The lengthy discussions of this subject by Seeliger, Goldstein, and Thiem, written twenty years ago are notable for the profundity of the argument and the superficiality of the fact-finding. They illustrate the futility of attempting to create out of vague possibilities varying degrees of probability.

Ten years later Ruckart reviewed 117 cases of hypernephroma in the literature, found nine in which a traumatic origin was suggested, but concluded that in all these the injury merely called attention to a pre-existing tumor. None of these contributions throw any light on the important question—what causes adrenal rests, and miniature adenomas of the kidney to start growing.

Today there is considerable evidence that the real factor consists in functional demands directed to the miniature organs from which the tumors arise and carried by hormones, especially those of the pituitary gland, thyroid, pancreas, and sex glands.

Cortical hyperplasia of the adrenal occurs under many conditions. It appears whenever there is an excess of Prolan A, and this condition is observed frequently with the decline of the sex functions or after castration. It is often found in acromegaly. Injections of prolan regularly induce marked cortical adrenal hyperplasia. The close relation between the structure and functions of adrenals and testes has been elaborated by Leupold and others. In a case of pseudohermaphroditism with rudimentary ovaries, Marchand found marked hyperplasia of the adrenals and an accessory adrenal as large as a testis. A marked enlargement of the adrenals is sometimes observed in pregnancy (H. Sternberg). Certain cortical tumors of

the adrenal possess marked masculinizing powers in both sexes (Glynn, Lit.). The interrelations between adrenals, thyroid, and pancreas were long ago pointed out by Falta, Rudinger and Eppinger. Schur and Wiesel noted cortical adrenal hyperplasia after partial nephrectomy and it is often observed in contracted kidneys. Marked disturbances of renal function are observed with many abnormalities of the hypophysis and with certain tumors of the adrenal gland. These and many other recent contributions reveal very numerous conditions in which unusual functional demands are positively known to produce adrenal and renal overactivity and hyperplasia, and they leave little justification for introducing the element of trauma into the origin of adrenal and renal tumors.

SUMMARY

1.—Present data confirm the view, long since adopted by pathologists, that a single trauma of normal tissues is incapable of producing a malignant tumor. This principle may not greatly alter the possible importance of trauma as an indirect but essential and determining cause of certain tumors.

2.—Delayed healing due to infection, suppuration, and chronic irritation by chemicals, and foreign bodies, is nearly always observed in cases where a tumor may be referred indirectly to trauma. Even in such cases it seems necessary to recognize the probable influence of heredity, and local tissue predisposition. Repeated traumas, acting on successively altered tissues are more likely to induce disordered regeneration than is a single injury.

3.—Only those tumors may safely be referred to trauma, in which the structure represents an exaggeration or variation of the normal healing process and its sequels.

4.—The rapid increase in the number of known cancerogenic agents, and the advances in the knowledge of the conditions under which tumors ordinarily develop, adequately accounts for the great majority of tumors, and greatly restricts the probable scope of trauma. When such agents or conditions are detected a presumption is established that the tumor is caused by them and not by any trauma.

5.—The chief task in determining the relation of trauma to any given tumor is one of laborious fact-finding. The great majority of reports of alleged traumatic tumors would disappear from the literature if the facts were competently gathered and evaluated. The laws of psychology demand that the statements of patients and eye-witnesses should be corroborated, the actual and probable immediate effects of the injury attested by competent persons, preferably physicians, and the entire case be studied from a broad clinical and pathological viewpoint. In the conduct of this study the various criteria now recognized in medico-legal inquiry must be employed.

6.—The probability of coincidence is much greater than is generally recognized. The innumerable and constantly occurring mild and severe wounds and bruises assure that a large proportion of tumors must receive some injury shortly before appearance or during their course.

7.—The presence of an unsuspected tumor tends to bring out the occurrence of injuries to the tumor bearing area, and to intensify the subjective symptoms and local effects of injury. This principle may be designated as traumatic determinism.

8.—Aggravation may be accepted when injury introduces into the course of a tumor significant features deleterious to the patient, and which do not normally occur in the course of the disease, at approximately the same time. It should be recognized that injury often causes temporary complications, the effects of which pass in due time, without

altering the general course of the disease. The idea that injury usually accelerates tumor cell growth is not supported by clinical and experimental data, and applies only to severe injuries in advanced stages of disease.

9.—It is reasonably well attested that trauma may cause the localization of metastases, and the appearance of metastases which might not otherwise occur, but only in the advanced stages of malignant tumors when tumor cells may frequently escape into the blood, at which time the metastases do not alter the course of the disease.

10.—Opinions regarding the possible traumatic origin of any tumor must be based on full consideration of the location, known conditions of origin, structural peculiarities, and clinical course of the tumors in each organ. Generalizations may be invalid or misleading. Such inquiries belong to the broadly trained clinician and the experienced tumor pathologist.

11.—The interpretation of compensation laws should recognize that trauma is never the sole cause of cancer, and often only a subordinate, although determining cause, that the probability of coincidence is very great, that aggravation by injury is rare and difficult to establish, and that many difficulties and uncertainties will continue to surround this subject for a long time to come. Some form of partial liability seems necessary to meet these conditions. Without it the compensation law becomes a form of sickness insurance against the natural occurrence and ordinary consequences of one of the major causes of disability and 10 per cent of the deaths.

12.—There is urgent need of more competent detailed analysis of individual cases of possible traumatic tumors, more extensive studies of the effects of trauma on different organs and tissues, and more accurate statistical studies of the incidence, course, and complications of all forms of benign and malignant tumors.

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AMENDMENTS TO THE BY-LAWS

The following amendments to the By-Laws were passed at the Stated Meeting of the Academy held March 7, 1935.

SECTION 4, ARTICLE XIII. The Committee on Fellowship shall recommend to the Council for promotion to Fellowship such Members as it determines have met the qualifications approved by the Council. If approved by the Council such Members may receive a diploma of Fellowship in (name of a Section or affiliated Society) upon the payment of a fee* to be determined by the Council. Such Fellows if they desire may designate themselves "Fellow of The New York Academy of Medicine in—(name of a Section or affiliated Society)."

SECTION 6, ARTICLE XIII. Any Fellow whose application for Fellowship was received prior to January 5, 1933, shall upon application to the Academy be granted the privilege of designating himself as a Fellow of The New York Academy of Medicine in (name of a Section or Affiliated Society). If a Fellow be so designated he may receive a diploma upon the payment of a fee to be determined by the Council. No Fellow may be designated in more than one Section. Any provision of the Constitution or By-Laws as adopted on January 5, 1933, which is contrary to this amendment is hereby revoked.

* The present amount is \$5.00.



LIBRARY NOTES

CORRECTION

Through an oversight we failed to include in our *Annual Report* under the heading, *Donors of large numbers of unbound journals*, the name of the First District Dental Society, which gave us 263 journals in 1934. These journals include various titles which we get no other way, and form a valuable addition to our collection.

ARCHIBALD MALLOCH, *Librarian.*

RECENT ACCESSIONS

MARCH

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 Brattleboro, Vermont
 Univ. of Vermont, 1898

Endorsed by:

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 Thomas J. Kirwin
 Irving Samuel Haynes

FIELDING H. GARRISON

The Council of The New York Academy of Medicine records its great loss in the death of Fielding H. Garrison, Colonel U. S. Army, retired, M.D., Litt. D. (Yale).

Col. Garrison left his mark on the Army Medical Library where he began his life work under the late Col. John S. Billings and the late Col. Robert Fletcher, and for years played a large part in compiling the Index Catalogue and the *Index Medicus*. His encyclopedic *History of Medicine* is today the best book on the subject in the English language. Since it opened in 1929, he has been the Librarian of the William H. Welch Medical Library, Johns Hopkins University. During his administration the various collections of the Hospital and Medical School have been welded together. His knowledge of medical history was broad and profound, he was extremely well read in the prose and verse of all ages, and his appreciation of the arts, especially of music, was remarkable. He was an excellent amateur pianist. Strange as it may seem he was well versed in thermo-dynamics. His knowledge was ever at the command of inquirers who wrote to him, for his memory was extraordinary and he was a dutiful and willing correspondent.

From the year 1925 on, he did notable service for this Academy as Consulting Librarian and later as Editorial Writer for its *Bulletin*. His articles which began to appear in 1925 have been read by many with avidity.

Resolved that this appreciation be spread on the Minutes of the Council and that a copy be sent to Col. Garrison's family.

DEATHS OF FELLOWS OF THE ACADEMY

CUTLER, COLMAN WARD, B.A., M.D., 140 East 54 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1889; elected a Fellow of the Academy October 6, 1904; died, March 17, 1935. Dr. Cutler was a member of the County and State Medical Societies, the American Ophthalmological Society, the New York Ophthalmological Society, the Society of Alumni of St. Luke's Hospital and a Fellow of the American Medical Association. He was Consulting Ophthalmologist to St. Luke's, New York, Woman's, Memorial, State Reconstruction Hospitals, St. Mary's Hospital for Children, and St. John's Hospital in Yonkers.

EISENBERG, ISIDORE CHARLES, B.A., M.D., 46 East 83 Street, New York City; graduated in medicine from the University of Vermont in 1891; elected a Fellow of the Academy January 4, 1906; died March 23, 1935. Dr. Eisenberg was a member of the County and State Medical Societies and a Fellow of the American Medical Association.

ELLIOTT, GEORGE ROBERT, M.D., 57 West 57 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1881; elected a Fellow of the Academy October 7, 1886; died April 27, 1935. Dr. Elliott was a member of the County and State Medical Societies and the American Orthopaedic Association, and a Fellow of the American Medical Association and the American College of Surgeons. He was Consulting Orthopaedic Surgeon to Montefiore Hospital and Orthopedic Surgeon to St. Francis' and St. Joseph's Hospitals.

HOWARD, ROBERT CARROLL, M.D., 839 West End Avenue, New York City; graduated from Cornell University Medical College in 1911; elected a Fellow of the Academy February 5, 1925; died May 4, 1935. Dr. Howard was a member of the County and State Medical Societies and the American Laryngological, Rhinological and Otological, and a Fellow of the American Medical Association and of the American College of Surgeons. He was Associate Otologist to Polyclinic Hospital.

MCKIM, WILLIAM DUNCAN, B.A., M.D., Ph.D., 1701 - 18th Street, N. W., Washington, D. C., graduated in medicine from the College of Physicians and Surgeons, New York City, in 1878; elected a Fellow of the Academy May 7, 1885; died, April 11, 1935.

MAY, WILLIAM ROPES, B.A., M.D., 168 East 74 Street, New York City; graduated in medicine from Harvard Medical School in 1898; elected a Fellow of the Academy March 7, 1907; died May 3, 1935. Dr. May was a member of the County and State Medical Societies and a Fellow of the American Medical Association. At the time of his death Dr. May was Attending Physician and President of the Medical Board at Willard Parker Hospital, Attending Physician to the Hospital for Ruptured and Crippled, Attending Pediatrician to City Hospital, and Associate in Diseases of Children at the College of Physicians and Surgeons.

MONAELESSER, ADOLPH, B.A., M.D., 40 East 61 Street, New York City; graduated in medicine from New York University Medical College in 1886; elected a Fellow of the Academy May 2, 1889; died March 27, 1935. Dr. Monaelessor was a member of the County and State Medical Societies, the American Urological Association and a Fellow of the American Medical Association. He was surgeon to St. Elizabeth's Hospital. For ten years, 1893 to 1903, Dr. Monaelessor was surgeon-in-chief of the American Red Cross. Of late years he had been widely known for his attempts to find a cure for cancer in a serum made from cobra venom.

MULHOLLAND, JOSEPH A., B.A., M.D., 325 West End Avenue, New York City; graduated in medicine from Cornell University in 1900; elected a Fellow of the Academy February 4, 1909; died April 4, 1935. Dr. Mulholland was a member of the County and State Medical Societies and a Fellow of the American College of Surgeons. He was otologist and laryngologist to St. Vincent's Hospital and consulting otolaryngologist to Foundling Hospital.

NATHAN, PHILIP WILLIAM, M.D., 110 East 78 Street, New York City; graduated in medicine from New York University Medical College in 1893; elected a Fellow of the Academy January 15, 1903; died April 20, 1935. Dr. Nathan was a member of the County and State Medical Societies and of the American Orthopaedic Association, and a Fellow of the American Medical Association and the American College of Surgeons. A pioneer in orthopedic surgery, Dr. Nathan headed the orthopedic service of Mt. Sinai Hospital from its beginning until his recent retirement. He was also associated with the Hospital for Ruptured and Crippled, Beth Israel Hospital, the New York Infirmary for Women and Children and Montefiore Hospital.

SCHLEY, WINFIELD SCOTT, B.A., M.D., 620 Park Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons in 1896; elected a Fellow of the Academy March 5, 1903; died April 1, 1935. Dr. Schley was a member of the County and State Medical Societies, the Pathological Society, the New York Surgical Society, a Fellow of the American Medical Association and of the American College of Surgeons. He was Associate Surgeon to St. Luke's Hospital and Consulting Surgeon to Ossining Hospital.

THOMAS, ALLEN MASON, Ph.B., M.D., 907 Fifth Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons in 1880; elected a Fellow of the Academy June 5, 1890; died March 18, 1935. Dr. Thomas was a member of the County and State Medical Societies. He was Consulting Physician to New York Nursery and Child's Hospital.

WHITE, JOHN FRANKLIN, M.D., 156 North Main Street, Port Chester, New York; graduated in medicine from New York Homeopathic Medical College in 1900; elected a Fellow of the Academy October 4, 1928; died April 15, 1935. Dr. White was a member of the County and State Medical Societies and a Fellow of the American College of Surgeons. He was at one time director of the surgical service of the United Hospital of Port Chester.

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* Executive Committee

BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

VOL: 11

JUNE, 1935

No. 6

THE PRINCIPLES GOVERNING THE RADIATION THERAPY OF CANCER*

(An elementary lecture)

GEORGE T. PACK

The Memorial Hospital, New York

This treatise is not concerned with the indications and contraindications for radium and x-ray therapy nor with the relative merits of surgical and radiation treatment of cancer. It is assumed that the cancers selected for treatment by irradiation possess some degree of radiosusceptibility. Failure to consider this premise has led to the injudicious use of these physical agents with consequent loss of confidence in their effectiveness. The cancer must be more radiosensitive than the normal tissues which contain it, else radium and x-rays could offer no advantages over any destructive, non-selective cautery. The radiologist should decide if possible whether his therapeutic efforts are to be curative or palliative, insomuch as different biological and physical principles are involved. He also realizes that radiosensitivity and radiocurability are not synonymous; some highly radiosensitive tumors may become a generalized or systemic disease early in their course (lymphosarcoma) while other more radioresistant tumors metastasizing late (some neuro and liposarcomas) are radiocurable by slow progressive radiation fibrosis.

* Read before the Stated Meeting of The New York Academy of Medicine, February 7, 1935, as a part of a symposium: The Facts About X-ray and Radium Therapy.

The selection of tumors of radiosensitive behavior for treatment by irradiation requires a knowledge of the histologic and biologic factors determining radiosensitivity, a familiarity with the natural history of malignant tumors of all regions and considerable clinical experience in observing the response of these tumors to treatment. Tumors of embryonal origin are well known to be highly sensitive to radiation due possibly to their morphologic peculiarities and high metabolic rate. There are exceptions to this rule such as the adult testicular teratoma and some tumors of mixed cell origin. The number of mitoses and the degree of anaplasia are important factors in the determination of radiosensitivity yet only in a relative sense, as some cellular, undifferentiated, rapidly growing cancers (melanoma, neurosarcoma) are notoriously resistant to irradiation. Ewing has repeatedly emphasized the importance of the influence of the intrinsic properties of the cells of origin and Stewart has succinctly stated that "in the case of many individual tumors the fundamental nature of the tissue of origin outweighs all other considerations when an attempt is made to estimate the sensitivity." Thus, the primitive blood-forming tissues predetermine the radiosensitivity of tumors developing from their lymphoid, myeloid and vascular derivatives (lymphosarcoma, myeloma, endothelioma, angioma) and the various tissues arising from the neural crest cells almost uniformly give rise to radioresistant tumors (glioma, neurosarcoma, melanoma, mixed tumor of parotid). The nature of the tissue bed supporting the cancer is of fundamental concern as every radiologist is cognizant of the difficulties and hazards encountered in irradiating cancer imbedded in cartilaginous, fat, osseous or fibrous tissue. Carcinomas are radioresistant in direct proportion to the extent of desmoplasia they excite. A soft, vascular stroma with tendency to cause a papillary structure of the tumor is more conducive to ischemic necrosis and rapid disintegration of the tumor under irradiation.

Methods of Radiation Therapy. There are two methods by which radiation may be applied to malignant tumors

within the body. One uses an external source, either an x-ray tube or a radium applicator containing a large amount of radium. The rays must then traverse overlying normal tissues before reaching the tumor itself. The second method utilizes a source (radium) which is applied directly into the substance of the tumor or surrounding it. This source may be single or multiple. By this latter method the tumor receives one hundred per cent of the dose and the surrounding normal structures much less. These methods may be designated as follows:

External Radiation.

A. X-rays.

1. Low voltage source for superficial tumors.
2. High voltage and super-voltage sources for deep therapy.

B. Radium.

1. Teleradium therapy. Large quantity of radium (grams) in bomb or pack applied at considerable distance (6 to 15 cm.) for deeply situated tumors.
2. Superficial therapy. Small plaques, trays and moulages of radium for superficial cancers (lip, skin, etc.).

Intracavitary Radiation—always radium. One or more filtered containers often in tandem arrangement and placed within the body cavities for contact application of radium against cancers in these locations, such as naris, orbit, antrum, larynx, esophagus, uterus, vagina and occasionally the rectum.

Interstitial Radiation. Intratumoral or peritumoral placement of radioactive foci in form of radium needles or radon seeds. This method is useful in the treatment of accessible cancers, chiefly as an adjunct to external radiation.

Units of Dosage. It is best to administer to all the neoplastic territory the maximal quantity of radiant energy compatible with the maintenance of tissue integrity. To speak intelligently of these quantities it is best to have some common physical and biological measures of the dosage. Thus in the case of radium the quantity of gamma rays at the source is known as the "dose of emission." One knows with precision the dose of emission because this is invariable. The dose emitted is expressed by two different notations. The one has for its basis the intensity of the gamma rays and the duration of their application; the

intensity is proportional to the quantity of radium present; the dose is obtained by the product of the quantity and the time, which is expressed as milligram hours of radium or as millicurie hours of radon (Gram hours or Curie hours in the case of large radium bombs or packs). The other notation, which is utilized throughout France, makes the dose proportional to the quantity of radium emanation destroyed (disintegrated) during the course of its application (Debierne and Regaud 1914). This is expressed in terms of "millicuries destroyed" or of "microcuries destroyed," the latter term connoting only one thousandth of the former. The physical efficiency of one millicurie of radon throughout its life is equivalent to 133 millicurie hours. Therefore one millicurie destroyed is equivalent to 133 millicurie hours or 133 milligram hours.

The dose of gamma or roentgen rays at the surface or the point of entrance into the body is the superficial dose while the dose to the tumor by unit volume of the tissues treated is the "tissue or tumor dose."

The unit of x-ray dosage called the "roentgen" or r unit (designated always by small r) has been standardized and internationally accepted. The roentgen has been defined as that quantity of roentgen radiation which, when the wall effect of the ionization chamber is avoided and the secondary electrons are fully utilized, produces in one cubic centimeter of atmospheric air at 0° C. and 76 cm. mercury pressure such a degree of conductivity by ionization that one electrostatic unit of charge is measured at saturation current.

In the measurement of x-rays and gamma rays by biological means the most common unit is the establishment of an erythema dose under certain conditions. Quimby of the physics department of the Memorial Hospital has defined and employed the term "threshold erythema," which is that dose of radiation that will cause a perceptible change in the skin of 80 per cent of the subjects and no discernible discoloration in 20 per cent in two to four weeks after the exposure to the rays. Quimby has found

that the threshold erythema with 200 KV., 100 sq. cm. field, 50 cm. target-skin distance and filter of 0.5 mm. of copper and 2.5 mm. of aluminum is 500 to 525 roentgens. The therapeutic erythema on the other hand varies in the hands of different radiologists from 600 to 1000 roentgens.

The Tissue Dose — Cancericidal Dose. The tissue dose of a given volume of tumor is estimated according to the point within that receives the smallest quantity of energy. At the Memorial Hospital, all tissue doses are expressed in threshold erythemas. Although the quantitative basis is the best we have for tissue dosage, the response of various cancers to this same dose is qualitative and there is no absolute biologic unit to express this response. The determination of tissue doses at all depths below the skin surface and in tumors of all sizes and shapes is relatively simple with roentgen-rays and external applicators of radium. The applicator dose necessary to produce the threshold erythema can be determined in each case by direct experimentation. The percentage of the amount falling on the skin which reaches various depths can readily be determined by means of a water phantom and small ionization chamber. The tissue dose delivered in any mass by external radiation may be considered as of that point which lies deepest or at the greatest distance from the skin portal. Every radiologist has isodose curves available for each type of external radiation applicator and with this aid the determination of the depth dose for each tumor is greatly facilitated.

The problem is more complicated in interstitial irradiation. The most common interstitial sources used at the Memorial Hospital are gold seeds about 4 mm. long, 0.3 mm. in wall thickness and containing from one to three millicuries of radon. Experimental work by Quimby makes possible the determination of the percentage of a threshold erythema dose delivered at any distance from any gold radon seed imbedded in a tumor. It is necessary for every point within the region of the tumor to receive a certain minimum dose; and it is the tissue dose for the point receiving the minimum that should be calculated. It is most

convenient to consider the sphere of tissue that will just contain the tumor to be irradiated. Martin and Quimby have shown that if a definite quantity of radon is to be used in any given sphere, it makes practically no difference in the dose on the periphery whether the radon be concentrated at the center or distributed uniformly within the inner half of the sphere. For purposes of approximation of dosage, they considered the radon to be concentrated at the center of the sphere that just contains the mass and calculated for the minimum the dose at a point on the periphery. Thus they were able to make a table giving the threshold erythema units for different quantities of radon in spheres of different sizes, which is of great value in the rapid calculation of dosage.

The practical value of these physical measurements is that the dosage of radiation is now on a rational rather than an empirical basis. The cancericidal doses for malignant tumors of the oral cavity, skin, breast, uterus, bladder, prostate, rectum and stomach have been determined and it is now possible to prescribe such a dose and the way it should be given, whether by external or interstitial irradiation or a combination of both methods. For example, intraoral squamous carcinomas require tissue doses of six to eight T.E.D. while transitional cell carcinomas (Ewing) and lymphoepitheliomas (Schmincke) require two to four S.E.D. for sterilization. To destroy the most radioresistant mammary cancer may require a tissue dose of ten threshold erythema units, although many radiosensitive carcinomas of the breast completely disappear after relatively small doses of external irradiation alone, when administered properly in fractionated doses.

Prescription for X-ray Therapy. A correct prescription for x-ray dosage is essential not only for purposes of record but also for the accuracy and safety of such treatments. A model prescription should mention the quantitative factor expressed in roentgens and the qualitative factor which is really the effective wave length of the beam of radiation. This may be expressed in Angstrom units or by stating the half value absorption layer of certain me-

talic filters. Most x-ray records are not so explicit and the effective wave length of the beam is indicated by the kilovoltage and filter employed. The target-skin distance should always be recorded and if possible the target-tumor distance or tumor depth. The size of the field, i.e., skin portal, influences greatly the proportion of scattered radiation, so the dimensions must be given for each area treated. Finally the time of application of the x-rays, whether the dose is given in a single treatment or fractionated over several days, completes the details of the prescription.

Kilovoltage (Potential). A high voltage current applied to an x-ray tube accelerates from the filament, electrons of great velocity which by their impact on the target of the tube produce the radiation known as X or roentgen rays. As the voltage is increased the average wave length of the beam of radiation becomes shorter and shorter. The shorter the wave length of the radiation the greater is the penetrating power of the beam. It is for this reason that the higher voltages (200 to 1000 KV.) are employed in deep x-ray therapy, while superficial tumors as of the skin are usually treated satisfactorily by low voltage x-rays. As the voltage is increased it has been found advisable to increase the filter accordingly in order to exclude the long, more easily absorbed and harmful rays. No x-ray beam as emitted by the target is truly homogeneous and the radiation produced in super high-voltage tubes has its quota of long, feebly penetrating rays which must be filtered out if the full effectiveness of the short-wave components of the beam is to be obtained. It has been estimated that one and a half million volts produces x-rays that approach in quality or shortness of wave length, the gamma rays of radium.

Electrostatic Production of High Voltage X-rays. The development of electric generators during the last one hundred years found its most suitable embodiment in the application of Faraday's principles of electromagnetism. Modern high voltage technic has evolved almost entirely under this influence until the present time. One of the first of the several "million volt" x-ray machines used for

cancer therapy in the United States was the cascade tube designed by Coolidge, Dempster and Tanis, for operation at a maximum of 900 KV. and which was kindly loaned to the Memorial Hospital by the General Electric Company in 1931. This high voltage generator is a special induction coil to which is applied 60 cycle alternating current at a maximum of 1100 volts. Although these electromagnetic generators have been improved and the limits of their applicability in the treatment of cancer by high voltage x-rays have not been attained yet there are some valid reasons for reconsidering the possibilities of electrostatic generators. Van de Graaff was aware of the great expense, complications and inherent defects of an impulsive, alternating or rippling source of current, the necessary large size of the electromagnetic generators and the fact that the efficiency of high voltage alternating current devices decreases rapidly as higher voltages are sought. Van de Graaff therefore devised an electrostatic generator of current based on the suggestion of Kelvin that the charges could be carried to the electrode on a belt conveyor consisting of alternately insulated metal segments. His electrostatic generator required a conducting terminal, its insulating support and a means for conveying electricity to the terminal, which needs were met by a hollow metal sphere supported on an insulator and charged by a rotating belt conveying electricity from earth potential and depositing it within the interior of the sphere. He has constructed four models, three being successive developments of generators operating in air and designed respectively for 80,000,—1,500,000 and 10,000,000 volts and the fourth being an essentially similar generator operating in a highly evacuated tank. It is this last type, which when equipped with a suitable target may eventually be one of our main sources of therapeutic roentgen rays. The upper limit to the attainable voltage is said by Van de Graaff to be set by the breakdown strength of the insulating medium surrounding the sphere and its size, while the upper limit to the current is set by the rate at which the belt area enters the interior of the sphere, carrying a surface density of charge, whose upper

limit is that which causes a breakdown field in the surrounding medium. Van de Graaff added a refinement to this apparatus by the addition of an induction device whereby charge of the opposite sign was carried by the belt on its return journey, thus doubling the current output. A second refinement consisted of a self-exciting charging device by means of which an external source of electricity was not needed. Although this outfit has not been used to treat cancer as yet, its perfection may well be one of the signal advances in radiation therapy.

Comparison of teleradium therapy with super-high voltage x-ray therapy. The interviews recently given to the lay press concerning the ultimate substitution of super-high voltage x-rays for radium and the consequent great economic loss to cancer institutes possessing large quantities of this valuable element are misleading and incorrect. Radium in the form of an external applicator such as a "bomb" or "pack" will probably be supplanted by roentgen therapy but the great value of radium remains as it always has been as the means of interstitial and intracavitary irradiation. External irradiation however proficient and applicable it may become will scarcely displace radium especially in its employment in emanation plants.

A comparison of teleradium therapy with an element or emanation pack and x-rays of a million volts will show little difference in biological effects with similar standards for control, if the same factors such as time of application and tissue dose delivered are considered. The million volt x-rays because of the greater intensity of radiation can treat many more patients in a given time, but this intensity may not be desirable since now we know that prolonged or continuous irradiation has many advantages. This roentgen ray outfit entails greater expense for maintenance and repairs and in some respects is less adaptable and flexible than a radium pack. The usual radium pack contains four grams of radium. If Van de Graaff's ten million volt electrostatic machine could be mounted in a vacuum and equipped with a tube, it would produce a beam of x-rays as intense as that which would emanate from

an applicator containing 5,000 tons of radium. Roentgen rays produced at voltages greater than 1,500,000 are of a wave length comparable to the gamma rays of radium.

The effective wave length of radiation. The wave length of x-rays depends on two factors; the energy given to the electron and the atomic weight of the target. The greater the atomic weight of the target, the shorter will be the wave length of the characteristic radiation. The targets of most x-ray tubes used in therapy are composed of tungsten, therefore this is a fixed factor. When the x-rays enter the body the targets encountered are of low atomic weight (sodium, potassium, calcium, etc.) therefore the secondary waves or photons are of long wave length and feeble penetration. The higher the potential applied to an x-ray tube, the greater will be the energy of the impinging electron, the shorter will be the effective wave length and the greater will be the penetrating power of the beam. Therefore by increasing the potential or kilovoltage increasingly shorter wave lengths are produced, the advantage of which lies mostly in their deeper penetration and the delivery of greater depth doses to tissues. Herein is the gain achieved by the advent of super-high voltage x-rays. Failla has found that the relative depth doses at 10 cm. depth obtained under comparable conditions with 200 KV. roentgen rays, 700 KV. roentgen rays, and gamma rays, are respectively 29.0, 41.2, and 56.7 per cent. Accordingly from this point of view, 700 KV. roentgen rays are considerably better than 200 KV. roentgen rays, but not so good as gamma rays. This advantage is not realized in clinical practice because it is not practical to apply radium at the focal distances used in x-ray therapy.

Although we have said that the relative values in radiation therapy of the different wave lengths depend on their penetrating power rather than on essential differences in biological effectiveness, we do not mean that there is no differential effect on tissues. F. C. Wood states that the only difference in the electrons from very high voltage x-rays and low voltage x-rays is the difference in speed of the electron and he states that this cannot produce much

difference in effect. We cannot subscribe wholly to this dogma. In the first place the number of ions produced per unit length of path of particles travelling at high speed depends on the speed of the particles. There is experimental evidence to prove the greatest concentration of ions occurs near the end of the path, when the speed of the particle is relatively low. This difference in concentration of ions depending on the speed of the electron must alter the rate of recombination of ions, which causes the chemical changes on which, presumably, radiation effects finally depend. Furthermore, we have clinical and experimental evidence to show that there is a differential action of radiation of different wave lengths in the case of normal (skin) and pathological tissues in the human body.

Ionization in Tissues. The lethal action of radiation on the cell is due to the absorbed energy, which results from the impact of the gamma or x-rays upon the atom and the release of electrons inside of the cell. The sequence of events in the cell seems to be triple; (a) ionization, (b) chemical changes and (c) biological effects. This subject having been considered in detail by Failla in his essay on "Ionization and its bearing on the biological effects of radiation," will be merely mentioned here. The initiation of the processes leading to the death of the cell is started by the transfer of energy from the beam of radiation to the matter of the cell. The phenomenon of ionization results when radiation (the particle of which is called a photon) transmits energy to an atom in its path with a resultant release of an electron traveling at high velocity and in turn expending this energy by removing still other electrons from atoms in its path. The two processes by which this transfer of energy from photons to matter takes place are (Failla³) : "(A) The photoelectric effect in which case all the energy of the photon is transformed at once and the secondary electron leaves the atom with a kinetic energy less than that of the photon by the amount necessary just to separate the electron from the atom, (B) the Compton effect, in which case the transfer of energy from the photon to the electron takes place according to the laws of elastic

impact, and depends on the angle which the path of the emergent electron makes with the path of the impinging photon. A photon can transmit practically all of its energy to an electron in the event of a head-on collision which sends the electron hurtling through space substantially in the direction which the photon would have followed had it not been stopped. If the electron is projected in any other direction the energy imparted to it is always less than this amount; its speed is lower and the number of ions which it can produce is smaller."

No electrons can be emitted backwards towards the source of radiation and at most they can be projected only at right angles to the path of the photon. But they necessarily deviate somewhat from their initial course because of impacts with atoms in their path and so eventually after deflections and pursuance of a zig-zag trail may travel in the opposite direction. The remaining energy of the impinging photon after an electron has been set free from the atom by the Compton effect is spent as a new photon of less energy, longer wave length and less penetrating power. These photons also undergo the same transformations and on impact with atoms release their energy to electrons or beta particles which contribute to further ionization in the tissues. With an increase in the intensity of radiation, there is a corresponding augmentation in the quantitative production of ions in a given time due to the greater number of beta particle tracks, called by Failla "ionization loci." As stated previously the concentration of the ions along the tortuous path of these high speed electrons varies according to their velocity and is greatest near the end of the electron's course where the speed of the particle is relatively low.

When an atom on impact loses an electron (a negative charge), the atom then has a positive polarity and may reunite with the freed electron or any other electron in its neighborhood. The wandering electron may attach itself to an atom forming a negative ion. An interchange of electrons takes place when these ions of different polarity come together, so that neutral atoms with resultant chemi-

cal changes follow these recombinations. This process of recombination always accompanies ionization; both occur constantly in tissues which are being irradiated. Not all such effects of ionization and recombination are responsible for biological changes because the chemical transformation may be harmless to the cell. Nevertheless it seems entirely reasonable to assume that the ultimate way in which radiation affects living tissues is by these chemical changes induced by ionization and recombination.

Current (Milliamperage). The current in milliamperes and the time required to deliver a given amount of energy are inversely proportional to each other. The milliamperage is essentially a measure of the number of electrons which strike the target. The usual x-ray tubes carry from four to thirty milliamperes. Thus a tube running at four milliamperes for 25 minutes would deliver 100 millampere minutes and a tube running at 25 milliamperes for four minutes would also deliver 100 millampere minutes or its equivalent in roentgens, other conditions remaining the same.

Filter. The penetrating power of the radiation or the quality of the beam may be changed by the interposition of filters (usually metallic) between the tissues to be treated and the source of radiation. Soft radiation of long wave length limits the effectiveness of the beam and lessens the relative amount of the beam which reaches the deeper tissues containing the tumor. The filter will remove these soft destructive waves and permit the shorter wave lengths to pass through and enter the deeper tissues and tumor, thus affording a greater depth dosage with less skin and surface reaction. A statement of the effective wave length is one of the ways of expressing the penetrating power, or hardness or quality of the roentgen ray beam or the beam from a source of radium. The effective wave length is expressed in Angstrom units. The quality of the radiation beam may also be stated as the "half-value layer" which is the thickness in millimeters of the filter (e.g. copper) sufficient to reduce the intensity by half. Failla and Quimby have found that the effective wave length employed

in the usual deep x-ray therapy at the Memorial Hospital is about 0.16 A.U. This treatment is given with 200,000 peak volts, filtered by 0.5 mm. Cu. and 1 mm. Al. With intermediate voltage of 140 KV. the filter may vary from nothing up to 6 mm. of aluminum; with a filter of 4 mm. Al. the effective wave length is about 0.25 A.U.

In the case of radium, the filters employed, usually brass, lead, silver, gold or platinum are usually expressed in the equivalents of certain thicknesses of platinum. One millimeter of platinum or its equivalent (occasionally 0.5 mm. platinum) is the customary filter for surface applications of radium or teleradium therapy. Intracavitory radium treatments are given with filters of 0.5 to one mm. of platinum, while interstitial irradiation requires considerably less filtration. Gold radon seeds have a wall thickness of 0.3 mm. gold and most platinum needles for interstitial use are designed with a wall thickness equivalent to 0.5 mm.

Size of the field of irradiation. Failla and Quimby have derived a formula by which the amount of radiation effective at any tissue depth for all practical conditions of treatment may be obtained. This formula takes into consideration, as must all quantitative estimations of dosage, the area of irradiation or the size of the skin port. In brief we may say that the larger the field, the greater will be the secondary and scattered radiation which is produced in the body of the patient. These rays may amount to as much as 40 per cent or more of the total irradiation. At a depth of 10 cm., with a large field, probably 80 per cent of the radiation is of this type. The area treated therefore receives the sum of the primary beam plus the part of the secondary rays which traverse it. These facts are taken advantage of in therapeutics; to give as great a depth dose as possible from one or more ports (e.g. in the oral cavity) the beam is directed with great accuracy through as small a port or field as possible, since by this means the superficial dose at the port of entry may be much higher with less skin damage than when a larger port is employed.

Target-skin or radium-skin distance. The inverse square law of radiation states that the intensity of a beam of roentgen rays or gamma rays varies inversely proportional as the square of the focal-skin distance from a point source. Thus the radiation intensity from a high voltage x-ray tube at fifty centimeters distance is almost twice that delivered at seventy centimeters focal skin distance. Or a radium applicator placed at 2 cm. radium-skin distance conceivably would deliver four times the superficial dose as the same applicator applied for the same time at twice the distance or four centimeters. (This is not exactly true since the radium applicator is not a point source.) This fact may be expressed also in the following manner. Since the dose is dependent on the product of the intensity times the duration of exposure, the radium treatment at four centimeters distance would require four times as many minutes or hours as at two centimeters radium-skin distance. The question naturally arises—why not decrease the focal-skin distance as much as possible to save time and expense? In the case of very superficial non-infiltrating skin cancers this plan is feasible but for more deeply situated cancers the depth or tissue dose is increased (in comparison to the dose delivered to the superjacent skin and tissues) with the greater skin-target distance. Theoretically the distance might be increased sufficiently so that the relative dose on the skin at the port of entry of the rays would be almost the same as at the location of the tumor within the body.

Heublein method of continuous irradiation. The late Dr. Arthur C. Heublein gave the Memorial Hospital a radiation unit designed to give continuous irradiation of low intensity and short wave length to the entire body. Intermittent teleroentgen therapy had been tried previously in England and Germany with inconclusive results. This clinical experiment was carried out by Heublein and Lloyd F. Craver in 134 cases over a period of two years. Craver concluded that it was a valuable addition to the treatment of several generalized and radiosensitive tumor processes, such as the leucemias, lymphosarcoma, Hodgkin's disease and multiple myeloma, and that its results in the treatment

of chronic lymphatic leucemias and pseudoleucemia seemed superior to any obtained heretofore by local irradiation. The treatment unit consists of a four bed ward with a Coolidge tube, operating at 185 KV. and 3 ma., placed near the ceiling behind the most distant wall. The patients placed at 18 feet and 24 feet from this source of radiation were continuously exposed to the beam of roentgen rays at this great distance. By an electric timing device it was determined that the patients averaged about twenty hours of exposure daily, the time out being due to nursing care and other interruptions. Considering 750 r measured in air as the clinical skin erythema dose for a single high voltage x-ray treatment, the time required to deliver a 30 per cent dose or 225 r to a patient in the bed at 24 feet target-skin distance was 250 hours, so at the rate of 20 hours of exposure daily, this dose could only be administered in 12.5 days. In the treatment of leucemia, Craver was particularly cautious but in other diseases he eventually increased the doses to 50 or 60 per cent S.E.D. (375 and 450 r) with no complications except the occasional development of leucopenia, anemia and thrombocytopenia in some cases. This work is one of the most important achievements in radiation therapy during the last decade and its principles of low intensity, great distance, continuous irradiation and long duration of treatment may soon be applicable in the local treatment of cancers that have otherwise remained refractory to present methods of applying radiation. The possible advantages, originally listed by Heublein were: "(1) the nearly uniform distribution of the rays throughout the body in treating generalized neoplasms; (2) the possibility that great protraction of treatment would make possible the irradiation of all the tumor cells during their period of mitosis when they are most sensitive and (3) the assumption that despite the protraction of treatment the intensity of radiation affecting any given cell would nevertheless remain sufficient to sterilize it."

The Time-Intensity Factor. It seems logical to assume that a cancer cell or a tissue cell would not be indifferent

to variations in the intensity of radiation. Such a cell continuously engaged in self-repair, the ingestion, consumption and storage of food, the excretion of waste products, the pursuit of its specific function and possible preparation for cell division is a living unit and must be capable of making certain adjustments to the influences of noxious agents to which it is exposed, whether they be chemical or physical. All physiological processes require time for their completion. If the doses were equal, the cell—either normal tissue cell or cancer cell—should be more tolerant of prolonged irradiation of low intensity than of short irradiation of high intensity. The end result of successful external irradiation is the destruction of the cancer cell and the preservation of the normal tissue cells; there is experimental and clinical evidence to indicate that long duration and low intensity of irradiation (within limits) has greater differential effects on tumor cells than on normal tissue cells. As will be shown later, the explanation of this fact is that the normal tissues possess greater recuperative power which is taken advantage of in the increased duration of irradiation. The low intensity and longer time of irradiation permits the accumulation of a much greater total dose than could possibly be given in a single massive treatment. The tumor cannot be removed from the body for treatment by irradiation, therefore the maximum dose which can be delivered to it from external sources of radiation is limited entirely by the tolerance of the tissue which contains it.

The answer to the question whether or not the normal and cancerous tissues might vary considerably in their differential reactions to changes in the time of irradiation by roentgen rays or radium has been provided by Regaud and his collaborators—Coutard and Lacassagne. They compared the effects produced on the anorectal skin and mucosa and the testicular tissues of the rabbit and ram by selected doses of irradiation delivered in different times. The testicles of mammals were chosen for these experiments because their behavior and structure closely resemble that of malignant tissues, e.g., frequent cycles of cellular

reproduction, active mitosis and radiosensitivity. This analogy between mammalian testicles (in a state of active spermatogenesis) and malignant tumors is also apparent in their response to roentgen and gamma rays. Regaud found that it was impossible to sterilize the testicles of the rabbit by the administration of a single massive dose of roentgen rays without causing serious lesions of the skin. If, without altering any of the other experimental conditions, he modified the chronological distribution of the dose, dividing it and lengthening the time of its administration, he observed a remarkable difference between the effects produced on the anorectal integuments and on those produced on the testicle. The effect on the integuments was attenuated and lessened while the effect on the testicle was increased. These studies on spermatogenesis and similar clinical experiments on the roentgen and radium treatment of epidermoid carcinomas furnished Regaud and Coutard with the data from which they formulated their theory of radiation therapy. Regaud's explanation of the superiority of continuous or fractionated irradiation over short intensive treatments is founded on the existence of alternating periods of radiosensitivity and of radioresistance in the life of the spermatogonia (in the experiments) and the cancer cell (in clinical practice). Spermatogenesis in a mammal such as the rabbit is a continuous phenomenon if the testicle is considered as a whole. But if one considers only a certain cell or line of cells on a seminiferous tubule, the function of reproduction by cell division is seen to be discontinuous and cyclic and the spermatogonia like cancer cells, pass through alternating phases of multiplication (brief phases) and of rest (long phases). In one line of cells, either spermatogonia or cancer cells, the phase of multiplication corresponds to accentuation of radiosensitivity (law of Bergonie and Tribondeau), whereas the phase of rest corresponds to a diminution in radiosensitivity. A short treatment therefore might destroy only those spermatogonia or cancer cells which are dividing at that time; it spares the others. It is only natural that prolonged and continuous irradia-

tion (in the case of radium) or well fractionated irradiation with proper spacing of the fractions into a fairly long time (in the case of roentgen rays) is more efficient than brief intensive irradiation, because in the first case the germinal or cancer cells are killed one after the other as the cycle progresses and these cells enter for the moment the phase of maximal radiosensitivity.

These principles are now so generally recognized that the prolonged irradiation of low intensity or fractionated cumulative treatments has found almost universal favor with roentgenologists and radium therapists. These treatments depend usually on the administration of sub-erythema doses repeated every 24 to 48 hours until a total dose of six to eight threshold erythema units may be delivered to one skin portal with perfect safety. To illustrate the application of this principle, let us consider the treatment of a hypopharyngeal carcinoma by high voltage x-rays only. Two lateral ports are used to cross fire the beams of radiation. With a single massive dose, only 850 roentgens can be given to each side of the neck without seriously damaging the skin. By the fractionated method 300 roentgens may be given daily alternating on each side of the neck until a total of 3000 to 4000 roentgens are delivered through each portal. Such a course of treatment requires three weeks to consummate the dose required to sterilize the carcinoma.

Recuperation of normal and neoplastic tissues. The advantages of prolonged irradiation of low intensity or fractionated cumulative treatments are probably explained by the differential recuperation of normal and neoplastic tissues. This fact can be appreciated best by reviewing the accepted four common methods of treatment, namely (a) the massive dose technic, (b) saturation dosage, (c) fractionated dosage and (d) continuous irradiation. By the massive dose method the full tolerance of the skin and normal tissues is exhausted by a single maximal exposure to radiation, so that this dose cannot be repeated for a long time. The tumor within the tissues while profoundly affected, possibly even to a greater degree than the skin,

still may survive this single dose and ultimately recover. Presumably normal tissues have much greater powers of recuperation than do neoplastic tissues, i.e., their rate of recuperation is faster. This fact can only be inferred from abundant clinical evidence at hand and from the comparative studies of Henshaw on adult and embryonal tissues. Duffy has shown that human skin can recover 69 per cent of the immediate damage in 24 hours and 76 per cent in 48 hours following the administration of a threshold erythema dose (525 r). The saturation principle was first described by Kingery who applied it in the treatment of skin diseases by unfiltered low voltage x-rays. Briefly it consists in the initial administration of an erythema dose and then maintaining the biological effect so produced by the addition of smaller doses at proper intervals. Kingery estimated that he could add 50 per cent of an erythema dose at the expiration of three and one-half days, to substitute for the 50 per cent depreciation of the original dose. Pfahler first successfully applied this principle to the treatment of cancer by properly filtered high voltage roentgen rays. In the fractionated method, previously described, a daily suberythema dose is given until a maximal effect is secured. The dose given every 24 to 48 hours is greater than the recuperation during the same period so that finally a cumulative effect is obtained. Our clinical experience leads us to believe that the results from this method are superior to the other two, possibly because the time interval and low daily dosage permits sufficient recuperation of normal tissues to maintain vitality in the irradiated part, while the more slowly recuperating cancer receives a total dose that is cancericidal. This principle has been applied by Craver still more in continuous irradiation by the Heublein teleroentgen-ray method. We may sometime find that we shall be treating cancer by the installation of numerous small x-ray units each operating at low intensity and irradiating patients through heavy filters and at relatively long distances for eight to twelve hours daily over a period of weeks. Then we should be taking full advantage of the difference in the recuperative abilities of normal and cancerous tissues.

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BENIGN AND MALIGNANT LESIONS OF THE FEMALE REPRODUCTIVE TRACT*

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The tumors of the female pelvis were among the earliest upon which radiation therapy was attempted. As a result a vast literature exists covering the clinical, pathological and physical aspects of the problem. From this mass of material it is a difficult task to assemble the essential facts which the title of this program calls for and to present them briefly to you.

In general it may be said that there are two special features which characterize the radiation of the female pelvis:

First, the pelvis is relatively favorable for the administration of large doses of x-ray owing to the absence of easily damaged, vital organs. Thus more x-ray can safely be given here than to the upper abdomen or thorax on account of the liver or lungs in these regions.

The second feature of radiation of the pelvis is due to the presence of the ovary. The functional cells of this organ are the most radiosensitive of any in the body and are invariably destroyed by a dose of x-ray or radium that has any significant effect on a pelvic tumor. The inevitable loss of function of the ovary incidental to effective pelvic radiation is of paramount importance in the selection of methods of treatment of benign tumors in young women. In the presence of malignant tumors with the life of the patient at stake and in older women with the menopause established, the ovarian effect may be disregarded.

Beside these general features, four points need to be considered for each type of tumor. These are of great importance.

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(1) The first point is the amount of radiation required for the cure of each type of neoplasm. Under this head are included the question of relative radiosensitivity in malignant tumors and the effect of radiation castration in the benign tumors.

(2) The second point is the special anatomy of each neoplasm, including the usual site of metastasis in the malignant tumors and the position of the ovary in the benign ones.

(3) The third point is the theoretical capacity of x-ray or radium to deliver the necessary dose to the tumor under the existing anatomic conditions.

(4) The final point is the practical effect as indicated in the end results of treatment.

These are the essential facts, although it cannot be claimed that data exists to supply the final answer to any of these points.

The principles involved in the radiation of the benign and malignant tumors in the pelvis are entirely dissimilar. Whereas, in the malignant tumors the radiation must directly affect and destroy the tumor cells, the benign tumors are chiefly influenced by the indirect effect of the radiation upon the functional cells of the ovary. The common benign neoplasms of the pelvis to which radiation may be applied are three in number, namely, fibroids of the uterus, endometriosis of the ovaries and peritoneum and hyperplasia of the endometrium.

(1) *Fibroids:* Most authorities agree that the effect of radiation of uterine fibroids is produced for the most part indirectly by the radiation destruction of the functional cells of the ovaries. Certain experiments have been performed to show this, but it is also fairly obvious from two simple considerations. It is known that a fibroid will atrophy after the normal menopause, and its atrophy after the artificial menopause can almost be assumed. Furthermore, a direct effect of radiation on the fibroid itself is most improbable, for no tumors of similar structure elsewhere in the body

would be affected by the amount of radiation given to the pelvis in the treatment of fibromyoma. For practical purposes, therefore, it may be assumed that the dose of radiation required for the treatment of a fibroid is that which will completely suppress the ovarian function. The full castration dose has been placed by various writers at 35 per cent to 45 per cent of a skin erythema. Attempts to give less to produce either a temporary amenorrhea or an amenorrhea without complete loss of all the endocrine activity of the ovary have not attained an accepted position in fibroid therapy. To give more than this amount may cause no harm, but no increased effectiveness can be obtained, until many times the usual dose is given.

The anatomical problem involved in the radiation treatment of fibroids is based on the position of the ovary. To deliver 45 per cent of a skin erythema to the ovaries is easily possible by any number of different x-ray techniques which need not be discussed here. It is also possible to destroy the function of the ovary with radium in the uterine cavity in most cases, but in the presence of large fibroids the ovaries are often displaced. In these cases, the radiation which reaches them from the uterine cavity may be insufficient. In general then, x-ray is the most universally applicable and satisfactory radiation method of treating fibroids.

The results of radiation treatment of fibroids should be practically perfect if the cases are correctly selected. The selection can be properly made only if it is constantly borne in mind that the only improvement that can be expected is that resulting from the loss of ovarian function. There are two chief effects of the ovarian suppression.

First, the menstrual periods will cease. Hence patients complaining only of excessive but regular periods, due to an increase in size of the uterine cavity or to a pelvic congestion will be relieved. On the other hand, if there is irregular bleeding due to pathologic hemorrhage from the local disease of a sub-mucous or necrotic fibroid, the bleeding will usually continue.

The second effect is an atrophy of the smooth muscle fibres of the uterus and its smooth muscle tumors. The reduction to be expected may be taken as roughly proportional to the atrophy of the normal uterus muscle after the menopause. Very cellular myomas may shrink more, very fibrotic tumors somewhat less. Few tumors will disappear entirely and in very large growths the shrinkage may be insufficient to eliminate all symptoms. Hence, tumors causing symptoms on account of great size must usually be excluded from the radiation group and are better treated by surgery.

The disadvantage of radiation of the pelvis in young women with fibroids has already been touched upon. In older women radiation is also contraindicated for fibroids because here the ovarian function is already gone and any symptoms present are due to special complications of the fibroids which will often be unaffected by radiation.

There should be no quarrel between the surgeon and radiologist over the treatment of fibroids. As experience accumulates, the indications will become clearly defined for each type of therapy. In practice, however, both surgeon and radiologist are apparently prejudiced in the favor of the method of treatment with which they are familiar. Accordingly, we find the percentage of cases treated by radiation in any series of fibroids may vary from as low as 10 to as high as 90 per cent.

We have reviewed the methods of therapy employed at the Roosevelt Hospital in the last twenty years. These are shown in the accompanying chart (Fig. 1), which gives the type of treatment employed in 3,334 cases. Radium was first available in the clinic in 1917 and was used very little at first. A peak in its use was attained in 1923 when approximately a third of the cases were treated by radiation. Since that time the indications for radiation have become more restricted. A second point shown by the chart is the tendency toward conservation of the ovarian function as indicated by the number of cases in which myomectomy was performed or ovarian tissue preserved. It is my impres-

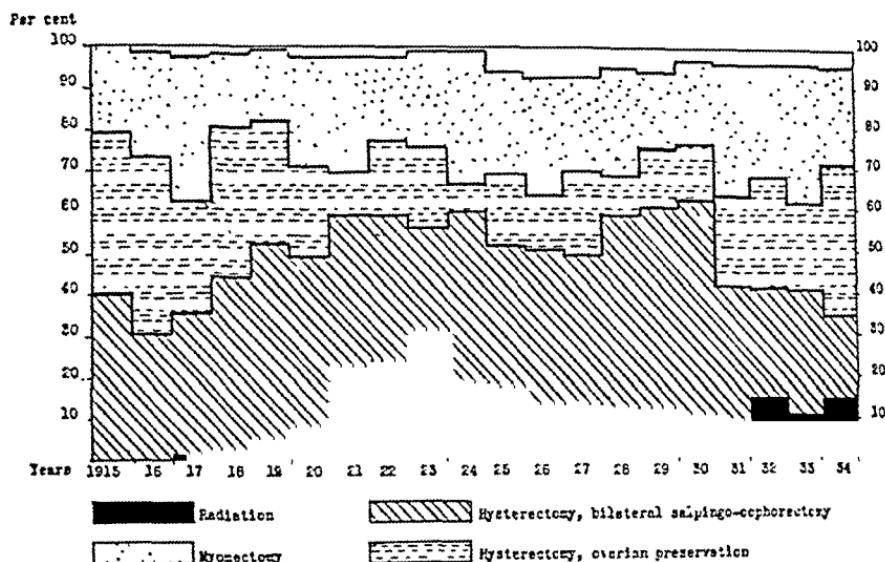


FIGURE 1.—Trends in the treatment of fibromyoma of the uterus.
3334 Cases from the Roosevelt Hospital, 1915-1934.

sion that the reduction in incidence of radiated cases has not been due so much to a loss of confidence in this agent of therapy as to a desire on the part of the doctor, or possibly the patient, to preserve ovarian function.

(2) *Endometriosis*: The effect of radiation on endometrial growths of the tube, ovary and peritoneum is again produced by the indirect means of a suppression of the ovarian function. Primary radiation of endometriosis is rarely possible owing to difficulties in diagnosis, but when symptoms persist after a conservative operation, radiation is better than a second laparotomy. X-ray is the radiation method of choice and the dosage is similar to that used for fibroids, except that here a temporary amenorrhea with small doses of x-ray may be tried. The successful treatment of endometriosis giving symptoms after a conservative operation has been reported by Albrecht, Seitz and others. It has been satisfactorily employed in a short series of cases at the Roosevelt Hospital.

(3) *Endometrial Hyperplasia*: The last benign neoplasm, if it may be called such, is the diffuse glandular cystic hyperplasia of the uterine mucosa. This is a very

frequent cause of uterine bleeding at or near the menopause and evidence exists to show that it results from an excessive stimulation of the endometrium by the follicular hormone of the ovary. The treatment is by radiation, the dose required being the amount necessary to destroy the function of the ovary. This can be accomplished by x-rays, but radium can be very conveniently used since the uterus is not enlarged and a curettage is invariably necessary to exclude the possibility of cancer.

MALIGNANT TUMORS

As has been noted, the radiation of malignant tumors of the pelvis is based on entirely different principles from those noted for benign growths. Here the radiation must produce its effects directly upon the malignant cells. This tissue is many times more resistant to radiation than the highly sensitive functional cells of the ovary. Treatment of cancer of the pelvic organs, when it fails, does so because the required dosage of radium or x-ray cannot be delivered to all tumor cells without the incidental destruction of normal tissue.

(4) *Cancer of the Cervix:* Cancer of the cervix is the most common type of malignant pelvic neoplasm and is the one for which radiation is apparently the best suited.

The amount of radiation required to kill all the cells of a cancer of the cervix is not definitely known. The earlier belief in a so-called carcinoma dose of 110 per cent of a skin erythema gives certainly too low a figure, for if this were true, practically all of the cases now receiving deep x-ray therapy should be cured. Schmitz has estimated the lethal dose at 150 to 170 per cent of a skin erythema for squamous cancer and 100 per cent for the so-called basal cell carcinoma. Lahm noted a wider range of radiosensitivity, with variations from one-third to four skin erythema doses. Certain observations indicate that in some instances at least, the lethal dose for cervical cancer may be still higher, for viable cells have been reported in the cervix itself after radiation at points which have theoretically received as much as ten or more threshold erythema doses.

That there is a difference in the radiosensitivity of different types of cervical cancer is probable, but the greatest diversity of opinions exists as to which are the most favorable types. Adler and Lahm, for example, considered the mature forms to be in general the most radiosensitive, while Healy and Cutler reported the undifferentiated types to be the most favorable to radiation. The majority of recent workers have found rather little difference in the prognosis of the different types.

In the accompanying chart (Fig. 2) are assembled the figures from four American and five German clinics on the curability by radium of different histological types of cervical cancer. Grade I includes the adult, prickle cell or ripe forms; Grade II, the transitional, plexiform and medium ripe forms, and Grade III, the spindle cell, anaplastic or unripe types. The entire group is composed of 1,327 cases. The differences between the cure rates in the four groups is scarcely significant so that it can only be said that at present the histologic grade is of doubtful value in prognosis. It is interesting to note also that the curability of adenocarcinoma, a supposedly radioresistant type, is essentially the same as the others. The first fact in regard to the radiation treatment of cancer of the cervix is therefore that at least four erythema doses must be given to all areas of the pelvis in which cancer cells may exist, regardless of the type of tumor present.

FIGURE 2

COLLECTED STATISTICS ON THE EFFECT OF THE HISTOLOGICAL TYPE ON THE CURE BY RADIATION OF CERVICAL CANCER

	Grade I Prickle Cell Adult Reif		Grade II Transitional Plexiform Mittelreif		Grade III Spindle Cell Anaplastic Unreif.		Adeno- carcinoma	
	Cases	Cures	Cases	Cures	Cases	Cures	Cases	Cures
American literature	188	22%	294	24%	136	27%	57	23%
German literature	132	25%	201	23%	205	25%	114	22%
Total	1327	320	495	23%	341	26%	171	22%

The pathologic anatomy of cancer of the cervix is the key to the failure of treatment in many instances. When cancer is strictly limited to the cervix, the disease is usually curable by either radium or surgery, but this group includes only about a tenth of the cases. In another fifth the disease has extended to the parametria close to the uterus and is still accessible to radium placed in the cervix or to expert surgical treatment. These two groups include practically all of the cases that can conceivably be cured by the use of radium placed locally in the cervix or vagina. This conception explains why the reports from most radiation clinics consistently indicate a cure rate of from 20 to 25 per cent of the cases. The exact method of application of radium is of relatively secondary importance and no technique of radium applied locally is capable of overcoming the physical difficulties imposed by the anatomic distribution of the disease in the remaining cases.

The iliac lymph nodes to which cancer of the cervix tends to spread lie at a distance of 7.0 to 12.0 cm. from the cervix. Their distance from the fundus of the uterus will vary, depending upon the position of that organ. The iliac nodes are involved according to Bonney in 40 per cent of the cases he operated upon. His operability was about 60 per cent. If one may assume that the nodes are involved in all of the inoperable cases of cancer of the cervix, then the cancer has spread to this region in 70 per cent of the cases of primary cervical cancer at the time of first admission. The distance which separates the iliac nodes from the cervix practically eliminates any effect from radium placed in the cervix. The second fact to be noted in the problem of cervical cancer is that to improve materially the results of treatment a lethal dose must be given throughout the pelvis to points 7 to 12 centimeters from the cervix.

It is this problem with which radiation in cervical cancer is at present chiefly concerned. One possible solution is the division of the x-ray dosage into multiple small treatments given over a course of three to four weeks. As an example of such a method is the technique employed at the Roosevelt Hospital for the treatment of cervical cancer, which is

similar to that in use in many clinics. The radium treatments are given in general according to the Stockholm plan of two applications with an interval of four weeks between them. At each application 100 mgs. in three platinum filtered capsules are inserted for 30 hours, the total dosage being therefore 6,000 milligram hours. Between applications the patient is treated with high voltage x-ray. Four large fields are employed, each field receiving five treatments of 400 r units each, or a total of 2,000 r units.

Such a method gives the equivalent in r units of at least 3 - 4 skin erythemas throughout the pelvis, which is within the theoretical range at which the cancer may be destroyed. It must be emphasized, however, that this treatment has been delivered over a month's time, and the theoretical lethal dose of cervical cancer is even less well understood for the divided dose than for the massive dose method. Far more x-ray can be tolerated by the skin when given by such a method, but it is also probable that the tumor itself can withstand a somewhat higher total dose. The effectiveness of the divided dose technique depends upon increasing the difference between the effect on the tumor and on the normal tissue. To what extent this occurs is not exactly known.

Nevertheless, the third fact about radiation in the treatment of cervical cancer is that only by x-ray or radium at a distance can the vital iliac nodes be reached. It remains undetermined whether division of the dose, increased voltage or other technical changes can accomplish the destruction of cancer cells at this point.

The final point, that concerning the practical results of treatment, should be an important one. I had intended to review the published end results for the last five years and to present to you a comprehensive summary. It had been my opinion that end results were the essential facts which the program called for. The literature of the last five years was actually reviewed, but the greater part of this material proved to be quite useless, partly because of the inconsistent method of reporting, but also because of the obvious prej-

udice with which both surgeons and radiologists have presented their work. Accordingly I am showing but briefly certain collected statistics.

FIGURE 3

COLLECTED STATISTICS ON THE ABSOLUTE CURE
RATE OF CERVICAL CANCER

	<i>Surgery and Radiation</i>		<i>Radiation</i>	
	Total Cases	5 Year Cures	Total Cases	5 Year Cures
Heyman—1927	5806	19.1%	3512	16.3%
Pankow—total cases to 1930	11133	16.7%	8918	17.2%
Pankow—recent cases to 1930	7366	19.0%	1598	19.0%
Major reports of 1930-1934	4679	27.8%	3735	23.6%

Figure 3 shows the gradual improvement in results over the course of the last seven years. The first figures were those compiled by Heyman in 1927 and show a cure rate of 19 per cent for cases treated by surgery, and of 16.3 per cent for cases treated by radiation. The second and third lines include a summary of reports compiled by Pankow in 1930. Finally there have been added the results from twelve outstanding clinics as published in the last five years. The radiation figure of 23.6 per cent is compiled from the recent figures of Heyman in Stockholm, Lacassagne of Paris, Voltz of Munich, Eymer of Heidelberg, Schmitz of Chicago and Healy and Ward of New York. The surgical figure of 27.8 per cent comes from the figures of the University Clinic of Berlin, the first University Clinic of Vienna and the work of Stoeckel, Bonney and Lynch.

(a) *Surgery:* The high percentage of surgical cures in this table are derived for the most part from clinics which are now combining surgery with radiation. Surgery as a single form of therapy has disappeared except from districts where radium or x-ray are unavailable.

(b) *Surgery in Combination with Radiation* has remained the method of choice in many of the larger clinics of central Europe. By this method the operable cases are

treated by the extended radical hysterectomy, especially by the vaginal approach, and receive in addition preoperative or postoperative x-ray or radium. The operability varies from 40 per cent to 60 per cent. The inoperable cases are treated by radium and x-rays as are such cases in any radiological clinic.

The results obtained by this combined method of treatment are far better than most Americans realize. Large series of cases from Berlin and Vienna indicate a cure rate of approximately 30 per cent of all cases coming to the clinics. One thing is certain, however, namely, that only the most experienced operators can hope to attain such results. For the occasional surgeon the death rate is undoubtedly high and the cures very rare.

(c) *Radium alone* as a substitute for surgery was a method generally in use five years ago. In many clinics consistent five year cure rates of 20 to 25 per cent were obtained. The total cures produced by radium or hysterectomy in operable cases remained statistically about the same. The immeasurable advantage of radium is found in the effect on the inoperable case, and in its low mortality. Collected statistics (Pankow) show a primary mortality for radium of 2 per cent, for vaginal hysterectomy of 7 per cent, for the abdominal hysterectomy of 15 per cent (Fig. 4).

(d) *The addition of high voltage x-ray* to the other methods of treatment offers the one substantial hope of increasing the cure rate. Treatment of cancer of the cervix by large doses of x-ray is of recent date, and most of the

FIGURE 4
PRIMARY MORTALITY IN THE TREATMENT
OF CERVICAL CANCER

	Cases	Deaths	Mortality
Abdominal hysterectomy	1665	301	18.0%
Vaginal hysterectomy	1293	89	7.7%
Radiation	8918	(205)	2.3%

radiological clinics in this country and abroad have not yet reported the effects on the five-year cure rate of the intensive use of x-rays. Lacassagne's reports, however, indicate that a real benefit may result, since his last figures showing cures in 35 per cent of all cases have been ascribed to the effect of roentgen therapy.

Radiological experience with the remaining types of malignant pelvic neoplasm is much less definite.

(5) *For Carcinoma of the Corpus* little is known of the actual radiosensitivity in terms of specific doses of x-ray. In certain clinics, as for example that of Paris, the belief is held that adenocarcinoma is a radioresistant tumor. This view is as vigorously denied in other institutions. The most anaplastic type is said to be more radiosensitive, but on account of its much greater tendency to metastasize, this type is less frequently cured.

Two anatomical problems are met with. First, in the large or irregular uterus with adenocarcinoma it may be difficult to apply radium in such a way that the entire cavity will be adequately radiated. This point has been emphasized recently in an article by Sampson of Albany. In the advanced cases with extension to the peritoneum the anatomic problem is once again that of delivery of adequate radiation by x-rays to large areas.

Radium in carcinoma of the corpus may be used as an adjunct to surgery or as a substitute for surgery. As a preliminary to surgery radium has been employed to prevent spread of loose particles of tissue at the time of operation and possibly to radiate adjacent parts of the parametrium. Whether this procedure has a significant effect has not been proven.

As an entire substitute for surgery, radium can undoubtedly cure a considerable number of cases of corpus cancer. For surgery alone the absolute cure rate has varied from 24 per cent to 58.8 per cent, the average being 41.07 per cent. In 1931 Pankow found that the absolute cure rate for radiation varied from 12.5 to 71 per cent, the average being

36.3 per cent. In compiling statistics from the reports of the last five years I found that the average had risen to 39 per cent for radiation (Fig. 5). Although statistics with such a wide range of variation are not very significant, it is notable that radiation is rapidly approaching surgery in the treatment of carcinoma of the fundus of the uterus, and may eventually replace it.

FIGURE 5

COLLECTED STATISTICS ON THE ABSOLUTE CURE
RATE OF CORPUS CANCER

	Surgery		Radiation	
	Total Cases	5 Year Cures	Total Cases	5 Year Cures
Pankow—total cases to 1930...	448	41.07%	688	36.3%
Major reports of 1930-1934....	...	.....	337	39.4%

(6) *Cancer of the Ovary:* The radiosensitivity of ovarian cancer shows a wide variation from the extreme susceptibility of the rare embryonal types to the relative resistance of the common papillary adenocarcinomas. The anatomical problem is a most difficult one, for extension of ovarian carcinoma to the upper abdomen is early, and heavy radiation can rarely be given in this region.

The local application of radium has little place in the treatment of ovarian cancer, for a very extensive area has to be covered by radiation. The favorable results from radiation in ovarian cancer are said to be found in certain cures by postoperative x-rays and the amelioration and prolongation of life in inoperable cases. Series of such cases are of necessity difficult to control. It is certain that surgical excision is still the essential of successful treatment.

For the less common types of pelvic malignancy radiation may also be indicated. For sarcoma of the uterus x-ray has been employed as a palliative or postoperative procedure. For cancer of the vulva radium has not met with favor as a method of treating the primary growth, but x-ray has received recognition for the treatment of the nodes either as the single method of treatment or as a prophylactic pro-

cedure following surgical excision. The relation of radiation to carcinoma of the vagina is similar to that for cancer of the cervix.

In conclusion the following may be said: Radiation methods of treatment have steadily gained favor in the treatment of gynecological tumors, but most important work still remains to be done. This includes a study of the actual amounts of radiation required to kill cancer cells of different types and a more constant consideration of the areas to which unrecognized extension may have occurred. To deliver an adequate dose to these areas, new methods of x-ray and radium application must be devised. Finally, a careful observation of the cases and accurate, standardized reporting of cases is essential if the effects of different methods of therapy are to be recognized.

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THE PRESENT STATUS OF CUTANEOUS X-RAY, GRENZ-RAY AND RADIUM THERAPY*

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and

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During the past two decades there has been considerable change in the status of these three agents relative to their use and their therapeutic value in dermatology. X-rays will be discussed first.

X-RAYS

The notable difference in status is that x-rays are employed less frequently and less empirically. There are several reasons for this change, reasons that will now be enumerated and elucidated.

There has been an improvement in apparatus, instruments of precision and technic. The changes in this respect consist in the adoption of an international unit of radiation intensity known as the roentgen, symbolized by the small letter r, and the manufacture of ionization dosimeters of the thimble type, calibrated in roentgens, suitable for use in practice by physicians who have received adequate training.

Before the advent of the roentgen and the practical dosimeter, dosage was standardized, determined and controlled by visible skin reactions plus certain electrical factors or constants such as spark-gap length, peak voltage, milliamperage, time and distance from the source of radiation to the skin. This indirect method stood the test of time and its reliability is sufficient for safety and for therapeutic results, but not for accurate scientific experimentation.

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The method is still in use and it will be many years before it becomes obsolete, but an increasing number of dermatologists are combining this method with the more sensitive and more accurate ionization method. Whereas formerly, quantity was recorded in terms of erythema, to which many operators gave a different interpretation, it is now recorded in roentgens, a term which has a definite, universal significance, plus quality which is recorded either by effective wave lengths (spectrometry) or half value layer in millimeters of aluminum. This improved technic has permitted more accurate and uniform experimental work by numerous investigators in various countries and a more reliable evaluation of comparative, contemporaneous effort. Without going into further detail, suffice it to say that more is known about the biologic and therapeutic effect of x-rays than ever before. The therapeutic advantages, disadvantages, limitations, safety and dangers of the agent are now well established. This in turn, has led to a more intelligent, rational, conservative and less empirical use of x-rays by dermatologists.

Another reason for the less frequent use of x-rays in dermatology is the fact that the specialty, during the past two or three decades has increased enormously in comprehensiveness. The dermatologist of the past was a morphologist, an "externist." Most modern dermatologists are well trained in the science and art of medicine and surgery, in laboratory work, in the scientific approach, in physical therapy and in the highly specialistic requirements of dermatology and syphilology. The older dermatological literature is replete with articles dealing with clinical impressions. The more recent literature contains a constantly increasing number of articles based on scientific experimentation and comparative statistics. During the past twenty years, as a result of work of this kind, much has been learned about the systemic and local etiology of many dermatoses and new, successful therapeutic measures have been discovered for diseases for which x-rays were formerly the method of election. The result of all this is that the well-trained modern dermatologist is much more

comprehensive. He possesses greater therapeutic resourcefulness, and he is capable of discriminating therapeutic judgment.

A few examples will be given. Years ago x-rays were considered the best therapeutic procedure for certain warts, lichen planus, acne vulgaris, certain clinical types of cutaneous tuberculosis, eczema, basal-cell epithelioma, keloid and other skin conditions. It is now known that approximately the same percentage of common warts can be made to disappear by any of several non-destructive methods—even by suggestion, some aver. A considerably higher percentage of plantar warts have been cured with electrosurgery than with x-rays or radium. Comparative statistics for acne vulgaris are both interesting and instructive but too complicated to be detailed here. X-rays are now considered suitable only for selected cases. For many years the treatment of lichen planus was under controversy. Certainly the impression prevailed that x-rays not only gave the best results but that they were almost a specific—but it was only an impression and an erroneous one. It is now known that mercury and arsenic, when properly employed, often give quicker results, and that the percentage of prompt and permanent cures obtained with x-rays is considerably smaller than was formerly thought. Various types of cutaneous tuberculosis and allied conditions are now treated more successfully with tuberculin, heliotherapy, diet, hygiene and other general medical measures and conventional dermatological therapy. There was a time when dermatologists and radiologists treated nearly every case of basal-cell epithelioma with x-rays and radium. Now, a constantly increasing number of physicians realize that the successful management of cancer, even basal-cell epithelioma, requires adequate experience with every established therapeutic method and the ability to judge, through clinical and microscopical study, the type, grade of malignancy and the radiosensitivity of the lesion. Only in this way can a physician select the method or methods most suitable for the particular case. Years ago almost every case of eczema was treated with x-rays. This was done partly because the agent so

frequently produced at least temporary relief, partly because it was the path of least resistance, and partly because less was known about this polymorphous affection then than now. The eczema of our forefathers has been divided into eight or ten varieties or clinical entities. Recognition of variety affords clues to etiology, mechanism involved and best method or methods of management. It no longer suffices to state that x-rays are indicated in eczema; they are indicated or contraindicated according to type and objective and subjective symptoms. Keloid is another example. It is now known that it is unwise to apply more than a definite amount of x-rays or radium to a keloid or hyperplastic scar regardless of whether or not improvement occurs. In many instances better results are obtained with some surgical procedure combined with judicious irradiation. Formerly, practically all cases of scalp ringworm were treated with x-rays. In recent years thallium acetate has been used successfully for this purpose but it has been found to be too dangerous except for selected cases. More important is the discovery that tinea tonsurans, when caused by certain fungi, is amenable to topical treatment, whereas when caused by other fungi x-ray treatment is necessary. Therefore, the modern routine is first to detect and identify the causative fungus and select the treatment accordingly.

In spite of the foregoing statements, it can still be said that x-rays constitute the most useful single remedy in the dermatological armamentarium. They are useful in approximately eighty skin affections. For the most part they are now employed as an adjuvant, or when other methods fail to effect relief. In many diseases they afford temporary relief only; in others, the result may be temporary, permanent; in still others, the result is very uncertain. Before the treatment is experimental. Finally, there are diseases for which, as yet, there is ~~no~~ ^{other rem} x-rays in efficacy.

The well-informed dermatologist knows what variety and stage of x-ray treatment; he knows wh

and when to depend on them partly, largely or solely; he knows when to begin and when to stop treatment; he knows the amount necessary for each disease and the quantity that can be safely administered; in other words, he knows all the advantages, disadvantages, possibilities, limitations, indications and contraindications, all of which has led to a much more conservative and intelligent use of the remedy.

Technic, indications and contraindications are now well established and can be taught. It is difficult, often impossible, to teach judgment. Today, irradiation injuries are seldom caused by well-trained dermatologists. When such men do have a bad result it is most often the result of faulty judgment.

So-called indirect methods of x-ray therapy have been recommended for some of the generalized dermatoses. For instance, x-rays have been applied to the region of emergence of the spinal nerves in cases of lichen planus, scleroderma, essential pruritus and other conditions; to the region of the thymus in cases of psoriasis; and to the lymphatic glands in cases of lupus erythematosus. Good results have been reported by some investigators while others have obtained indifferent or poor results. At the present writing the consensus of dermatological opinion is that these methods are of questionable value. As a routine, when a disease is treated with x-rays, the radiation is applied directly to all areas of eruption.

There has been a controversy as to whether unfiltered or filtered radiation should be employed as a routine. It is still a debatable topic. There are advantages and disadvantages associated with either method. Suffice it to say here that practically all dermatologists utilize unfiltered radiation for routine purposes. A filter of from one to three millimeters of aluminum is used for thick lesions, deep lesions, for tissue that is comparatively radioresistant and, often, when very large doses are advisable or necessary.

THE RADIOACTIVE ELEMENTS

In general, the remarks concerning x-rays apply, also, to radium therapy and need not be repeated. Radium has never been as useful to the dermatologist as has x-rays. This is due partly to expense, both money and time, but mostly because many dermatoses that are amenable to irradiation, involve extensive surface. Obviously, radium therapy is unsuitable for any but circumscribed areas.

Until within recent years the efforts of most dermatologists, in the field of radium therapy, were limited to the use of a half-strength, flat, radium element applicator or plaque which ranged in size from a dime, a postage stamp or larger. While such applicators are still used, their field of usefulness is exceedingly narrow. Some dermatologists possessed additional applicators of the same type but of various sizes and shapes; and, also, radium element needles and tubes. Such equipment increased the range of therapeutic usefulness considerably. Radon therapy, that is, the use of tiny tubes of glass, gold or platinum, containing radon (radium emanation) which might be implanted in a lesion (interstitial therapy) or which could be employed as an applicator for external application, was available only to those dermatologists who were connected with institutions equipped with a large amount of radium, a radon laboratory, a physicist, etc. Today it is possible for dermatologists to purchase or rent, at moderate cost, any quantity of radon in any type of applicator, from a commercial house, certain institutions and certain radiologists. Under adequate control this scheme can be sanctioned. In the absence of such control it should be condemned. It is a blessing to humanity and a boon to the medical profession to have radon available to all physicians who are qualified to use it; but much more harm than good is likely to result by placing this invaluable but dangerous agent in the hands of physicians who lack necessary knowledge and experience. Particularly objectionable and dangerous are diagnosis and instructions by mail, telephone and telegraph.

However, the point to be emphasized here is that dermatologists are now being trained in the modern use of the radioactive elements. Radon and radium element applicators of any shape and size, containing any number of milligrams of radium element or millicuries of radon, with any degree of screening or filtration, are now available. Thus the scope of radium therapy in dermatology is now comparable with that of large institutions and radium specialists.

In dermatology radium therapy is used mostly for selected cases of cutaneous malignant neoplasms, certain hypertrophies and benign new growths, selected cases of cavernous angioma and strawberry marks, and selected cases of leucoplakia and other precanceroses.

GRENZ-RAYS

Grenz-ray therapy is a recent acquisition, having been called to the attention of the medical profession by Bucky about ten years ago. Previous to Bucky's work grenz-rays had been used in laboratories, and somewhat similar radiation had been employed therapeutically by Schultz and others as early as 1910. For several years subsequent to Bucky's announcement there was a long-continued and unfortunate controversy regarding the nature of the radiation. It is now thoroughly established that grenz-rays are x-rays of a wave length longer than any heretofore used for therapeutic purposes. The beam is heterogeneous. Most of the radiation is absorbed by the epidermis and the upper layers of the derma, depending upon the thickness of these parts; but there are, also, wave lengths capable of considerable penetration, so that there is some absorption in the deep cutis and subcutaneous tissues.

Grenz-rays are much safer than are ordinary x-rays. No cases of third-degree radiodermatitis (indolent ulcers) have yet been recorded in spite of large doses—several or many thousand roentgens. The reaction caused by doses ordinarily used in practice may be intense, but it is superficial and, as a rule, repair is complete. Occasionally, however,

x-ray sequelae remain—persistent pigmentation, depigmentation, atrophy and telangiectasia. It is possible that, in time, sequelae of a dangerous character may occur, namely, keratoses. The agent should be used only by those who possess technical and specialized clinical skill.

Compared with ordinary x-rays, the field of usefulness of grenz-rays in dermatology is small. With few exceptions grenz-rays accomplish nothing therapeutically that cannot be achieved with ordinary x rays. Conversely, the latter are useful for many conditions for which the former cannot be used. The area of skin that can be exposed at one time is a circle having a diameter of about four centimeters. Obviously, as with radium, the method is unsuitable for the irradiation of universal, generalized or extensive eruptions. It is especially indicated when it is necessary to avoid injury to important organs and glandular apparatus in or under the true skin—hair roots, sebaceous and sweat glands, testes, eyes, etc. Even here, there are limitations. With heavy dosages, or repeated applications, enough of the shorter wave lengths may be absorbed by tissue below the epidermis to effect undesirable and, perhaps, serious injury. However, the method is comparatively safe and it is useful for many eruptions on the scrotum, eyelids and scalp—eczema, lichen planus, psoriasis, mycosis fungoides, lupus vulgaris, keratoses, superficial basal-cell epithelioma, etc. Grenz-rays may be used with comparative safety in the case of infants and children.

Published reports of therapeutic results are, as yet, rather meager, they emanate from comparatively few investigators, and the number of cases of any one disease is too small for satisfactory evaluation. Most of the favorable results have been obtained with large doses. There has been very little experience with small doses administered once weekly.

Good results have been obtained occasionally in the following conditions: patches of eczema of various types, patches of lichen planus and psoriasis, localized essential pruritus, perlèche, warts of several types, lupus vulgaris, tuberculosis verrucosa cutis, basal-cell epithelioma, super-

ficial cavernous angioma, strawberry mark, port-wine mark, the Kaposi type of sarcoma and a number of other conditions.

Attempts have been made to influence various systemic affections by applying small doses of grenz-rays to eight areas on the trunk. The same scheme has been used, also, for some skin diseases, especially those that involve extensive surfaces, those that are characterized by remissions and exacerbations, and those that are caused by some systemic disturbance. Good results have been reported with this type of treatment in a number of diseases but the results have not been, as yet, sufficiently corroborated.

At present, grenz-rays are considered a useful but not an indispensable therapeutic agent. Future events may or may not make a modification of this statement necessary.



THE ROENTGEN RAY TREATMENT OF TUMORS OF THE BRAIN AND SKULL*

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It was my original intention to discuss the roentgen ray treatment of a number of types of nervous diseases, but it has been necessary to forego this aim and limit myself to the subject of tumors of the brain and skull due to the shortness of the time at our disposal. It is my belief that all intracranial tumors (pituitary tumors excepted) should be removed surgically if possible.

That roentgen rays are of aid in the treatment of certain intracranial tumors there can be no doubt; on the other hand, in other tumors the roentgen rays have not the slightest effect on the symptoms or the course of the disease. I have observed this many times in the past five and one half years at the Neurological Institute. The tumors which have responded to this mode of therapy are: Pituitary adenomas, all the various types, eosinophil, chromophobe, basophil and mixed adenomas, medulloblastomas, some astrocytomas, fibroblastic meningiomas, hemangiomas of bone, hemangioblastomas, angiomas of the brain and multiple xanthomas. The glioblastomas multiforme will occasionally respond to this mode of treatment. The neoplasms which do not react favorably to roentgen therapy are: acoustic neurinomas, bucco-neural pouch tumors (Rathke pouch tumor, craniopharyngioma, suprasellar cyst) and many of the gliomas such as oligodendrogloma, astroblastoma or ependymoma; also dermoid cysts, epidermoids and the meningiomas with the exception of the fibroblastic type.

Before discussing the treatment of the sensitive neoplasms it is probably well to consider some other aspects of the problem. The roentgen therapy of tumors of the

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brain should be done, with few exceptions, only after the diagnosis has been made by microscopical examination. In other words, the roentgenologist should know the histological nature of the tumor before therapy. Furthermore, it is advisable to treat cerebral neoplasms only after a cranial decompression has been provided. This is due to the fact that severe intracranial reactions may follow this form of therapy. Thus, there are a number of reports in the literature where a roentgen treatment was followed by coma, violent headache, vomiting and even death. These accidents are infrequent, but nevertheless it is advisable to have the patient in the hospital during the first series of treatments to determine the degree of reaction the patient will have following the prescribed dose. Thus, if untoward symptoms develop following treatment, active therapy to combat the increased intracranial tension can be instituted at once if the patient is in the hospital whereas considerable delay of such therapy would occur if the patient were not hospitalized. Caffeine sodium benzoate, intravenous hypertonic glucose and magnesium sulphate given either by mouth or rectum are indicated, the latter in the less severe cases.

The onset of vomiting, increased visual difficulties, psychic phenomena or headache should cause one to be extremely cautious in administering more therapy. Furthermore, to minimize the occurrence of unfavorable reactions to the treatment, not more than fifty per cent of an erythema skin dose should be given at any one sitting.

Another point that comes to mind is the necessity for an exact localization of the lesion. Prior to nineteen hundred and twenty, an accurate localization of the neoplasm was often lacking even after an exploratory operation, but since the advent of encephalography and ventriculography, a definite localizing diagnosis can almost always be made.

From the above it is evident that one must be sure a tumor is present, where it is and what its histological nature is before roentgen therapy is given. Without further remarks the radio-sensitive tumors may be considered.

Pituitary Adenomas. Four varieties of this tumor are now recognized, three of which, the eosinophil, chromophobe and mixed adenoma are common. The remaining type, the basophil adenoma is rare. In my experience each of these types is radio-sensitive to practically the same degree although in some clinics it is felt that the chromophil adenoma is the most responsive. In discussing the matter of radio-sensitivity of these tumors, it is my impression that the patients with a short history have done better following therapy than those with a history of several years.

What can the patient expect from radiotherapy? Several years ago Dr. Clarence Hare and I studied twenty cases in detail. From this material it was found that in twenty-five per cent of the patients there was marked improvement of vision, while in an additional fifty per cent the vision remained stationary for a period varying from five months to a year. The general symptoms such as headache, lethargy, diplopia and fatigability were relieved in seventy-five per cent of the cases. Often headache is the most distressing symptom and it is surprising how frequently it will disappear within forty-eight hours after a single fifty per cent dose of roentgen rays. In twenty-five per cent of the cases the vision continued to decrease in spite of treatment. One explanation for this is that about twenty per cent of pituitary adenomas are cystic and of course the roentgen rays will have no effect in these cases. No doubt you are interested to know how long these favorable reactions may be expected to last. This can be predicted only in a general way, but in many instances the beneficial effects of radiation may last for years.

I have chosen two cases for demonstration. The first one has a chromophil eosinophilic adenoma and the second a chromophobe adenoma. These illustrate the favorable effect of radiation over a period of five years and four and a half years respectively.

Case 1.—*Advanced acromegaly. Bitemporal hemianopia with constricted nasal fields; headache. Roentgen therapy.*

*Moderate improvement in vision and relief of headache.
Observation period, five years.*

W. W., a man aged 34, was admitted to the Neurological Institute in the service of Dr. E. G. Zabriskie on October 13, 1929. He complained of failing vision, bitemporal headache, muscular fatigability and gain in weight. In 1924, he first noted an enlargement of his hands and feet, and this progressed until they attained a tremendous size. During the following five years he gained eighty pounds (36.3 kg.) and was dull and lazy. Direct questioning revealed that he also had polyuria, polydipsia and loss of libido during this five year period. In 1928, one year prior to admission, he was first troubled with bitemporal headache, and the vision in both eyes began to fail. These symptoms increased in severity during the ensuing year.

The patient weighed two hundred and forty-eight pounds (112.5 kg.) and had advanced acromegaly, with huge hands and feet. The visual acuity in the right eye was 20/40, and in the left it was reduced to the ability to see gross movements of the hands. The visual fields showed bitemporal hemianopia with a constriction of the nasal fields, more marked in the left eye. Both optic discs were somewhat paler than normal, and the pupils were equal and reacted well to light. Roentgenograms of the skull revealed a definitely enlarged sella turcica with the posterior clinoid processes displaced backward and the floor depressed. The sella turcica measured 24 by 18 mm. Roentgen examination of the hands revealed typical acromegalic changes in the bones. The tolerance for carbohydrates was decreased and the basal metabolic rate was minus 16.

Roentgen therapy was instituted on October 29, 1929 and was continued intermittently until February 1931. During that period the patient received six series of treatments. The headache subsided almost immediately after the first treatment and a gradual improvement occurred in the visual acuity and the visual fields. The general improvement was such that he was able to return to work. When last seen in January 1935, after more than five years

of observation, the visual fields had enlarged so that both nasal fields were complete as tested on the tangent screen. Perimetric tests showed the vision extending completely to the normal limits of vision in the nasal fields and into the lower quadrants of the temporal fields. The acuity in the left eye had improved from the ability to see movements of the hands to 20/20, and in the right eye from 20/40 to 20/15. The patient stated that the headache was much less severe and less frequent and that he was able to do a full day's work at his plumbing trade. The acromegalic signs of course persisted, but showed no obvious advance. He lost nine pounds (4.1 kg.). Libido was still markedly decreased.

Comment.—When this patient was first seen, he was entirely disabled; vision was greatly reduced and blindness seemed imminent. The improvement has continued for over five years, he is able to work and he leads a comfortable life. This patient is placed in the group with improvement of vision and relief of the general symptoms. We would emphasize the fact that he has not received roentgen treatments since February 1931 and that in spite of this, the improvement has continued.

Case 2.—Adenoma of the pituitary gland; no operation. Bitemporal hemianopia with diminished visual acuity; severe headache. High voltage roentgen therapy. Complete relief of symptoms and return of visual acuity and visual fields to normal. Four and one-half year period of observation.

E. Q., a man, aged 32, was admitted to the service of Dr. C. A. Elsberg on July 12, 1930. In February, 1930, he first noticed blurring of vision in the temporal field of the left eye. This was accompanied by mild occipital headache. His vision continued to fail so that in June, 1930, he could see only shadow movements with the left eye and objects appeared blurred in the temporal half of the right eye. At the time of examination, headache was so severe that he was compelled to stop work as an electrician. The libido was greatly diminished.

A glandular disturbance was evident by the deficiency of hair on the body, overdevelopment of the breasts and an enlarged thyroid gland. The patient was 5 feet, 7 inches (170.2 cm.) in height and weighed 173 pounds (78.5 kg.). Both pupils reacted sluggishly to light. The left optic disc was somewhat pale; the right appeared normal. Visual acuity in the left eye was limited to the ability to see gross movements in the nasal field; that of the right eye was 20/30. The visual fields showed temporal hemianopia in the right eye and only a very small nasal field in the left eye. Roentgen examination of the skull showed the sella turcica to be slightly deformed. Metabolic studies showed the basal rate to be minus 18 and the tolerance for carbohydrates to be slightly increased.

Irradiation was begun on July 18, 1930 and five days later some improvement was noted in the visual fields. In a short time the headache was relieved. Six months later, after three series of roentgen treatments, the field of vision of the right eye was practically complete and the visual acuity was 20/20. The patient was entirely free from headache. Treatment was continued and with improvement in the fields the patient was able to return to work. During the summer of 1931, he was able to play tennis and golf without difficulty. In January, 1935, four and one-half years after the first treatment, he was entirely free from symptoms and his vision was subjectively normal. The visual fields as tested on the perimeter showed the peripheral vision to be practically complete. The libido had in the meantime returned to normal.

Comment.—The effect obtained in this case was remarkable and has persisted for four and one-half years. This is the best result we have observed and may be due to the early institution of therapy.

Gliomas. The gliomas have been subdivided into a number of groups by the neuropathologists. Thus, there are astrocytomas, glioblastoma multiforme, oligodendro-gliomas, medulloblastomas, ependymomas, pinealomas and several other types. These tumors, as many of you know,

comprise about forty-two per cent of all intracranial neoplasms. It is difficult to remove them entirely by means of surgery for various reasons which need not be discussed here. However, it is my belief that a glioma should first be attacked surgically and followed later by radiotherapy.

To my knowledge there is no report in the literature of a proved case of glioma of the brain which has been cured by radiotherapy. Then why do we continue to treat gliomas of the brain in this way? There are two answers; first, because radiation is the only form of therapy left to offer a patient following incomplete surgical removal; and secondly, x-radiation apparently does have a restraining effect upon the growth of some types of glioma. I feel in regard to the second reason that giving x-radiation is somewhat comparable to the giving of digitalis to the patient with cardiac decompensation or morphine for the relief of pain. In using digitalis or morphine the object is not to repair the basic pathological process, but to alleviate symptoms. This is what is accomplished in part with x-radiation in many patients with gliomas of the brain and the inevitable outcome is delayed for variable periods of time. Often during the postoperative period the patients live a happy and comfortable life. However, after a certain period, these patients begin to lose ground, and symptoms such as headache, vomiting, choking of the discs and paralysis of an arm or leg increase. I then advise them to try another series of roentgen ray treatments and it is gratifying to note how often within forty-eight hours after a single treatment the headache subsides and the vomiting lessens. In other patients this occurs only after they have received the whole series of treatments. Because of the beneficial effects of radiotherapy it is now instituted shortly after operation. Furthermore, the patient will often be benefited by a single series of treatments for two to six months after which he may have a relapse. An additional series of treatments is then administered with probably again some relief from symptoms of increased intracranial pressure. This may be repeated three or four times. But finally, roentgenotherapy is of no value and death usually follows shortly. In the

meantime, the patient has been able to live fairly comfortably for a period of six months to several years and the time during which the patient is miserable and acutely ill is shortened.

The roentgen technic used in treating the supra-tentorial tumors is as follows: Three or four portals are used, the rays being directed toward the lesion. Treatments are given every other day until a one or one and one-half erythema dose (800 r units measured in air equals an erythema) has been applied to each portal. In this way 3200 r to 4800 r units are given over a period of 16 to 25 days. The factors used are 200 kilovolts, 8 ma., 50 cm. distance, 1 mm. Al. and $\frac{1}{2}$ mm. Cu. filter; 40 minutes equals 800 r units. These factors are used throughout unless otherwise specified.

Medulloblastomas. Several years ago Dr. Elsberg instituted more conservative measures in the treatment of these highly malignant tumors of the cerebellum. It was his feeling that since they could not be removed in toto and since they often recurred in several months' time following operative interference, more conservative measures were indicated. He felt, therefore, that patients suspected of having a medulloblastoma should have a suboccipital decompression and enough tissue removed for proper histological studies. Following this, the patients were to receive vigorous roentgen therapy to the cerebellum and spine because otherwise these tumors not infrequently become implanted in the basal cisterns or spinal subarachnoid space. Since that time this idea has been carried out and the results apparently have been as good as those from radical surgery.

The roentgen technic used in the treatment of these patients is as follows: The suboccipital region is divided at the midline, thus allowing the use of two lateral portals. The roentgen rays are directed toward the midline through a portal 8 x 8 cm. in size. The treatments are given on alternate days and fifty per cent of an erythema dose is given to each portal. Following this, the entire spine is

radiated as a prophylactic measure. I know of no case which has developed spinal symptoms since we have used this procedure.

Glioblastoma Multiforme. This neoplasm is a rapidly growing one common in middle-aged adults. It occurs in the cerebral hemisphere and its course is short, usually around twelve months. A considerable number of these tumors have been treated and only a few of them have shown a favorable reaction to roentgenotherapy.

Astrocytoma. The astrocytomas are slow-growing tumors. Many of them have a life history of five or more years and it is difficult to be sure of the effect of radiotherapy on this type of tumor. However, it appears that in some cases roentgenotherapy causes the tumor to grow more slowly and it seems to me that it makes many of these patients more comfortable during their illness. In some of these cases in particular, the headache is relieved, vomiting controlled and even the paralysis of an extremity lessened for a time. It is therefore our procedure to treat all patients harboring an astrocytoma as there is no way of predicting from the histological preparations which neoplasms of this type will or will not respond.

Meningioma. The meningiomas are as a class resistant to the roentgen rays. There is only one type, the fibroblastic meningioma, which is somewhat radiosensitive and it is worthwhile giving this type of tumor x-radiation when it has been impossible for the surgeon to do a complete removal. The roentgen technic employed is the same as that used for any other deep-seated tumor.

Cavernous Hemangioma. During the past few years two hemangiomas of the skull have come into the series. One was a hard bony tumor of the frontal bone and was removed surgically. The other was a soft fluctuating mass about 4 cm. in diameter. When the latter was punctured by a needle, bright red blood appeared in the syringe. This case was treated with the roentgen rays. Four series of treatments totaling 3200 r units were given to the mass over a period of six months. At the end of this time the

mass had decreased to about one-third its original size and had become bony hard. In addition, the patient's attacks of headache, nervousness, fainting spells and tremor of the left hand disappeared and she has no complaints at the present time.

Cerebral Angioma. These are of two types, the arterio-venous and the venous. Not infrequently the only symptom produced by these lesions is convulsions and in two patients the number and severity of the convulsive attacks were greatly lessened after several series of roentgen ray treatments. The cases which responded were venous angiomas. Others of the same roentgenological appearance have been treated with no apparent benefit. This has also been true of a number of arterial angiomas, although Cushing reported one arterial angioma which became bony hard after radiation.

The same factors are employed in treating patients with angiomas as in the other types of tumors. However, the dose at each treatment is decreased to one-fourth or one-fifth of an erythema and the treatments are given about once per week.

Hemangioblastomas. The hemangioblastomas are infrequent tumors which usually reside in the cerebellum. These tumors, like the other vascular neoplasms, show some response to roentgenotherapy.

Xanthomatosis. (Schüller's Disease, Christian's Syndrome, Pick-Niemann's Disease, Lipoid Histiocytosis.)

Xanthomatosis is primarily a disease of the reticulo-endothelial system in which the endothelial cells become laden with lipoid material. These cells become deposited in masses in many organs of the body but the skull bones and meninges are affected in a high percentage of cases. The bones of the skull usually show multiple irregular defects in the roentgenograms and due to the accumulation of these masses of cells in and about the hypophysis, infundibulum and orbits, diabetes insipidus and exophthalmos are common.

Roentgenotherapy applied to the defects of the skull causes a rapid healing of the involved areas. This is evident in a few weeks' time and is well established at the end of two months. Only the lesions which are actually in the path of the roentgen rays undergo repair. Additional defects may appear in the other bones of the cranium so that it is necessary to treat the areas as they become visible. Sosman was the first to describe this finding.

If diabetes insipidus is present the roentgen rays should be directed to the pituitary gland and hypothalamic region. Since this is a chronic illness it is necessary to give small doses of roentgen rays so that the skin will not be injured. Therefore, doses of one-eighth to one-tenth of an erythema should be used weekly or bi-weekly. Since many of the lesions are several centimeters below the skin surface, high voltage is necessary.

Metastatic Carcinoma. Metastases to the brain from other organs is not uncommon, but our material is too limited for comment except to say that an occasional patient does well with radiotherapy.

CONCLUSIONS

1. Roentgenotherapy not infrequently controls and is often of great benefit in the treatment of pituitary adenomas and is likewise of great benefit in the treatment of xanthomatosis.
2. It is of considerable aid in the treatment of the venous angiomas and some astrocytomas and hemangioblastomas and is of some aid in treating medulloblastomas, glioblastomas, the fibroblastic type of meningioma and some cases of metastatic malignancy.
3. Roentgenotherapy is of no aid in treating acoustic neurinomas, bucco-neural pouch tumors, dermoids, epidermoids and many of the gliomas such as the ependymomas, oligodendrogiomas and astroblastomas.

A SKIN TEST TO SUGGEST THE DIAGNOSIS OF RECOVERED TYPHUS AND THROMBO- ANGIITIS*

CHARLES GOODMAN

The incidence of gangrene during convalescence, or following the recovery from typhus fever had been emphasized by the earlier writers, such as Jordanus of the 18th Century and followed in the 19th Century by Von Hildebrand, Blüm Deppisch, Graber, Aspelin and others.

Reports describing outbreaks during the Serbian campaign 1913 and 1914, as well as those covering the World War record the same findings.

A study of the epidemiology of typhus fever shows distinctly that in countries where the disease is quite common, thrombo-angiitis obliterans is also abundantly found. On the other hand, in countries where typhus fever is lacking or rarely present, the latter condition is usually less frequent.

A number of investigators abroad, including Wolffe, Wiener, Fraenkel, Brauer, Jochmann and others, as well as Wolbach in this country, have stressed the fact that the infection often has a predilection for the intimal lining of the vessels of the extremities.

Based upon these studies, I presented a hypothesis before the meeting of the New York County Medical Society in March, 1916, that thrombo-angiitis obliterans was a late manifestation of a previous typhus infection. Since that time, Zinsser has offered evidence for the belief that the virus of typhus may remain latent in the system for an indefinite period.

Through the courtesy of Dr. William H. Park, I have recently undertaken, in conjunction with Dr. Maurice Brodie, further studies as to the possible etiological relationship of thrombo-angiitis obliterans to a typhus fever

* Read before the Section of Medicine, May 21, 1935.

infection. This evening we wish to present a preliminary report of our observations as to how a series of skin tests¹ made with formalized Rickettsia suspension in cases of thrombo-angiitis obliterans compares with a series of similar tests in cases of recovered and convalescent typhus and in a series of so-called normals.

The vaccine for this purpose was furnished us through the courtesy of Dr. Zinsser, from the Department of Bacteriology and Immunology, of Harvard University. The technique consisted in an intra-cutaneous injection of from 0.1 to 0.2 c.c. of the vaccine on the palmar aspect of the forearm. As controls, a Proteus X 19 filtrate and a formalized suspension of tunica vaginalis from healthy guinea pigs were used.

The tests were given to a series of 11 cases who had had typhus fever; in one case the diagnosis had been established six months previously, and in the others from one to eight years before. These cases were obtained through the courtesy of Dr. J. Rosenbluth, of the Bureau of Communicable Diseases of the Department of Health.

In all cases, the diagnosis of typhus was confirmed by a positive Weil-Felix reaction with the exception of one in which the test had not been carried out. For the controls, 17 adults with no previous history of typhus fever were given similar skin tests. The patients were observed for 24 and 48 hours after the injections were made. It was found that none of the controls gave any reaction, whereas all of the eleven with a previous history of typhus infection showed an erythematous, indurated area from 1 cm. to 4 cm. in diameter. Another individual similarly tested one week after convalescence likewise gave a positive reaction 2 cm. in diameter.

These results suggest that patients recovered from typhus fever display a sensitivity to Rickettsia bodies, as is indicated by the observations reported. Although this series is a small one, these findings suggest that the skin sensi-

¹ Proc. Soc. Exp. Biol. & Med., May, 1935. In press.

tivity lasts a considerable length of time. Whether or not this constitutes an evidence of a latent infection with Rickettsia bodies, must yet be determined.

In a second series of 17 adults with thrombo-angiitis, some with, and others without gangrene, the skin test was similarly made. For the controls, Proteus X 19 filtrate was used in 13 cases, and a suspension of tunica vaginalis in the remaining 4. In all the series of cases, we observed at the end of 24 hours, a positive reaction with Rickettsia, and a uniformly negative reaction with the control material.

SUMMARY

We have submitted evidence based upon a skin test with formalized Rickettsia suspension for the possibility that thrombo-angiitis obliterans is related to a previous typhus fever infection.

DISCUSSION

DR. PARK: I had not really intended to discuss this because I have only been an onlooker and really all I think I can say is that I have admired the quiet persistence with which Dr. Goodman has carried on this idea, sometimes for years not being able to go a bit further with it. And I am very glad, with Dr. Brodie's help and Dr. Zinsser's help, that he seems to be reaching a successful conclusion where his ideas will be granted by all to be correct.

DR. BRODIE: I don't feel that I have anything to add to this. I can just say that the evidence seems to indicate that there is a sensitivity developed after typhus infection to the Rickettsia bodies which are evidently the etiological agent, and that this sensitivity is present in thrombo-angiitis obliterans cases, which would suggest that perhaps these cases are the same, etiologically, which is strengthened by the fact that two cases have shown evidence of thrombo-angiitis obliterans.

I might say in a fairly acute case we have tested yesterday, there is evidence that this test shows up very soon after

the infection. This test which is positive for typhus infection seems to indicate that it is a specific test for an infection with Rickettsia bodies.

DR. SAMUELS: I would like to ask Dr. Goodman if these are the cases of thrombo-angiitis which he studied at my clinic and if so what were the results in cases of arteriosclerosis?

DR. SILBERT: I am not in a position to discuss the skin tests as such. However, it has been my opportunity to see really hundreds and hundreds of cases of angiitis obliterans. The clinical evidence that thrombo-angiitis obliterans is in any way related to typhus seems to me meagre, indeed. Undoubtedly, cases have come from Russia where typhus may be very frequent which might show thrombo-angiitis obliterans, but there are hundreds of cases that have come from other countries than Russia and hundreds of cases developed in the United States. And taking a careful history of these cases as they come one is impressed with the fact that there is no history, very much, of any febrile disease which might possibly have been typhus. So that the clinical evidence that thrombo-angiitis obliterans results from typhus, on that basis falls down.

I had an opportunity to discuss with Dr. Goodman his ideas and I asked him, "Is it your idea that thrombo-angiitis obliterans represents an active typhus, or is it the result of a typhus which is entirely quiescent or entirely withheld or healed?" He said he felt that this was still an active typhus, a different form perhaps but still an active form of typhus. I said, "How do you then account for the fact that in hundreds of cases that have been observed carefully for years and years up to twelve years, the cessation of the use of tobacco causes an absolute cessation in the progress of the disease?"

His only answer to that was, "Does it?"

Well, I followed these cases very carefully. I have actually seen over a hundred cases of thrombo-angiitis obliterans. I have never seen the disease in a non-smoker.

I have never seen progression of the disease in a patient who, once gotten into good condition, has not smoked; and any of those patients who resume smoking after once being put in good condition, within a short time will again manifest evidences of the disease.

The evidence that it is due to typhus is very, very meagre. The evidence that it is due to smoking is overwhelming, I mean in those individuals who are susceptible to tobacco. But without the use of tobacco it is my opinion that the disease never develops, and it is also my opinion that the evidence that the disease has any relationship to typhus has not been definitely shown.

DR. HARKAVY: The observations of Dr. Goodman are of course interesting in the sense that they stimulate a great many questions. In the first place I am sorry I was late, but you said he had two cases who apparently had thrombo-angiitis only in addition to any other cases of typhus who did not and who gave a positive skin reaction to Rickettsia bodies. Now it is a curious fact that many other infectious diseases may be associated and followed by thrombosis of the vessels of the extremities. For example, typhoid fever. Everybody has seen typhoid fever associated with phlebitis, and other infectious diseases as well. In view of the fact that smoking is so very prevalent and in view of the fact that people in Russia frequently have typhus, there is no particular reason why patients who have had typhus should not develop thrombo-angiitis due to tobacco. As a matter of fact it is also possible, if you tested cases of thrombo-angiitis who have never had typhus fever with this streptococcus filtrate or any other organism which represented a past infection like typhoid, they would have either a positive skin reaction, even if they had only had a positive Widal due to typhoid immunization. And would you draw a conclusion from that, that thrombo-angiitis, if it happened to have occurred in these people, was due to typhoid or due to the fact that these people had a positive Widal and therefore it had to be due to typhoid? That type of reasoning, while obviously it may seem logical, is not really in accordance with the facts. It is also possible that patients

with angiitis obliterans may have either a constitutional shock organ or may have a shock organ which is so as a result of previous infection.

CHAIRMAN WEST: I think we will have to stop the discussion at this point. Dr. Goodman?

DR. GOODMAN: I am very glad Dr. Samuels is here. I want to express my gratitude in having had the opportunity of testing a number of cases from his clinic in which he had verified the diagnosis of thrombo-angiitis obliterans.

With reference to the cases of arteriosclerosis, two of which also were furnished by his clinic, these were negative, both to Rickettsia and the Proteus X 19 filtrate.

With reference to Dr. Silbert's statements, the question of history as demonstrated on the tables, there were two cases where the history of a typhus fever showed unmistakable evidence of thrombo-angiitis. It is difficult to get a history from many of the cases of thrombo-angiitis because the majority of them are foreign born and of the peasant class, the type that come from countries such as Russia, Austria, Serbia and Roumania where it is very difficult to obtain a definite history of typhus fever. However we know that typhus fever is in the epidemic stage in most of those countries practically all of the time, if not most of the time.

The question of whether it is in a quiescent or active state can best be answered by mentioning again the statement of Dr. Zinsser who recently said that he believes the virus may remain latent in the body for an indefinite period and recrudescences may make their appearance from time to time.

With regard to the tobacco question, most of these cases are foreigners and come from countries where the economic conditions are such that these people, although they may have the desire to smoke, haven't anything to smoke, and if they do any smoking they acquire it when they come to this country where the cigarette is readily obtainable.

Dr. Harkavy emphasized the statements made in my presentation. The controls, both the proteus as well as the tunica suspension test, proved to be negative in each and every instance of the cases shown in the table. These comprised a group of normals as well as a group of arteriosclerotics and several diabetic gangrenes. Of course, if we wish to discuss the various theoretical problems that arise in anything that is presented, we would never get anywhere. I believe from the evidence presented that we are on the right track.

I might add, Mr. Chairman, that in 1922 when Dr. Wolbach of Harvard published his monograph on typhus fever, I had two pathologists examine the vessels removed from amputated limbs for gangrene in cases of thromboangiitis, and both of these well-known pathologists reported that they had found Rickettsia bodies or Rickettsia-like bodies in the vessels, but at that time we did not know what Rickettsia bodies meant. More recently they have been shown to be living organisms and have been cultured in the animal and grown as well in tissue culture.

Name	Type of Case	Age	Nationality	Sex	Reaction to Rickeletti's Suspension	Reaction to Proteus X 19 Suspension	Reaction to Proteus X 19 Filtrate	Tunica Vaginalis Suspension	Size of Reaction
*A. L.	T. A. O.	47	Russia	M	+	++	—	—	1 cm.
E. N.	T. A. O.	30	U. S.	M	+	+	—	—	4 cm.
L. I.	T. A. O.	21	Italy	M	+	+	—	—	1½ cm.
H. B.	T. A. O.	62	Galicia	M	+	+	—	—	4 cm.
M. P.	T. A. O.	44	Russia	M	+	+	—	—	4½ cm.
J. B.	T. A. O.	47	U. S.	M	+	+	—	—	1½ cm.
S. J.	T. A. O.	52	Russia	M	+	+	—	—	2 cm.
I. R.	T. A. O.	33	Russia	M	+	+	—	—	1 cm.
W. B.	T. A. O.	35	U. S.	M	—	—	—	—	1 cm.
B. G.	T. A. O.	57	Russia	M	+	+	—	—	1 cm.
H. H.	T. A. O.	36	Austria	M	+	+	—	—	¾ cm.
A. C.	T. A. O.	48	Russia	M	+	+	—	—	1½ cm.
*F. W.	T. A. O.	63	Roumania	M	+	+	—	—	1 cm.
B. K.	T. A. O.	30	Ireland	M	+	+	—	—	2½ cm.
M. C.	T. A. O.	31	Italy	M	+	+	—	—	2½ cm.
H. Z.	T. A. O.	45	Russia	M	+	+	—	—	4½ cm.
E. S.	T. A. O.	30	Russia	M	+	+	—	—	1 cm.

T. A. O.: Thrombo-angitis obliterans.

Pro. urt.: Urticaria followed the use of suspension of Proteus X 19—not the filtrate.

*Gave definite history of typhus fever infection.

Name	Typhus Type of Case	Age	Nationality	Sex	Reaction to Rickettsia Suspension	Filtrate Proteus X 19	Reaction to Rickettsia Suspension	Interval between Infection and Test	Size of Reaction
K. M.	Recovered	19	U. S.	M	+	-	-	2½ yrs.	4 cm.
	Typhus		Russia	M	++	-	-	1 yr.	2 cm.
S. H.	Recovered	40	Russia	F	++	-	-	4 yrs.	2½ cm.
S. R.	Recovered	46	Russia	F	++	-	-	3 yrs.	1½ cm.
B. T.	Recovered	41	Russia	F	+	-	-	4 yrs.	1 cm.
B. G.	.....	55	Russia	M	+	-	-	4 yrs.	3 cm.
A. F.	Recovered	38	Russia	M	++	-	-	4 yrs.	1 cm.
N. B.	Recovered	55	Russia	M	+	-	-	5 yrs.	1 cm.
E. M.	Recovered	46	Russia	M	+	-	-	6 mos.	1 cm.
F. W.	Recovered	53	Russia	M	+	-	-	8 yrs.	1 cm.
	T. A. O.		Russia	M	+	-	-	1 wk.	2½ cm.
A. L. . .	Recovered	47	Russia	M	+	-	-		
H. R.	Convalescent	38	Russia	M	++	-	-		
	Typhus								

T. A. O.: Has symptoms of thrombo-angiitis obliterans.

Name	Type of Case	Age	Sex	Nationality	Reaction to Richestisina Suspension	Reaction to Proteus X 19 Filterate	Reaction to Tunicin Suspension	Reaction to Vaginitis Suspension	Reaction to Urtica Suspension
N. H.	Normal	45	F	U. S.	-	-	-	-	-
H. E.	Normal	40	F	France	-	-	-	-	-
J. P.	Normal	38	M	Greece	-	-	-	-	-
L. P.	Normal	29	M	Italy	-	-	-	-	-
L. S.	Normal	33	M	Alsace	-	-	-	-	-
T. J.	Normal	28	M	U. S.	-	-	-	-	-
D. L.	Normal	31	M	Hungary	-	-	-	-	-
M. B.	Normal	30	M	England	-	-	-	-	-
A. E.	Normal	30	M	France	-	-	-	-	-
A. E.	Normal	32	M	U. S.	-	-	-	-	-
A. D.	Normal	39	M	Germany	-	-	-	-	-
A. W.	Arterio-sclerosis	64	M	Germany	-	-	-	-	-
H. M.	Arterio-sclerosis	58	M	Roumania	-	-	-	-	-
W. F.	Arterio-sclerosis	72	M	Ireland	-	-	-	-	-
A. W.	Arterio-sclerosis	64	M	Germany	-	-	-	-	-
A. K.	Diabetic gangrene	63	F	U. S.	-	-	-	-	-
M. S.	Diabetic gangrene	55	F	Ireland	-	-	-	-	-

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PROCEEDINGS OF ACADEMY MEETINGS

MARCH

STATED MEETINGS

March 7

- I. EXECUTIVE SESSION—*a.* Reading of the Minutes; *b.* Election of Members; *c.* Vote on proposed amendments to By-laws.
- II. PAPERS OF THE EVENING—*Symposium:* Angina Pectoris, with Special Reference to Coronary Artery Disease; *a.* General considerations, Emanuel Libman; *b.* Treatment of the patient, Harlow Brooks; *c.* Evaluation of surgical treatment, H. M. Marvin, New Haven; *d.* Discussion, Alexander Lambert, Marcus Rothschild, John Wyckoff.

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

March 21

THE SIXTH HARVEY LECTURE, "The Relation of the Circulation in Voluntary and Plain Muscle to Activity," Prof. G. V. Antep, Professor of Physiology, Egyptian University.

This lecture takes the place of the second Stated Meeting of the Academy for March.

SECTION MEETINGS

SECTION OF SURGERY—March 1

- I. READING OF THE MINUTES.
- II. PRESENTATION OF CASES—*a.* 1. Pharyngoesophageal diverticulum. Two stage diverticulectomy; 2. Large pharyngoesophageal diverticulum causing complete dysphagia. Two stage diverticulectomy. Recurrence; 3. Small pharyngoesophageal diverticulum; One stage diverticulectomy, William L. Watson; *b.* 1. Saddle embolus of bifurcation of aorta, with gangrene of lower extremities; Bilateral amputations; 2. Embolus of popliteal artery with resulting gangrene and amputation; 3. Tuberculosis of the sigmoid colon with perforated diverticulitis; Mikulicz resection and recovery; 4. Epiphyseal dislocation of head of femur, Closed reduction, Nelson W. Cornell; *c.* Case of chronic empyema, Pol N. Coryllos.
- III. PAPERS OF THE EVENING—*a.* Relationship of pancreatic reflux to acute cholecystitis, Ralph Colp; Discussion, John Douglas; *b.* Rationale of treatment for chronic empyemas based on their pathogenesis, Pol N. Coryllos; Discussion, Carl Eggers.

IV. GENERAL DISCUSSION.

SECTION OF DERMATOLOGY AND SYPHILOLOGY—March 5

- I. PRESENTATION OF CASES FROM MT. SINAI HOSPITAL.
- II. MISCELLANEOUS CASES.
- III. DISCUSSION OF SELECTED CASES.
- IV. EXECUTIVE SESSION—Appointment of Nominating Committee; *Examination of cases is limited to members and their invited guests.*

COMBINED MEETING OF THE NEW YORK NEUROLOGICAL SOCIETY AND THE SECTION OF NEUROLOGY AND PSYCHIATRY—March 5

- I. PAPERS OF THE EVENING—*a.* The effects of caffeine and depressant drugs on the highest integrative functions, Harold G. Wolff; Discussion, Lawrence S. Kubie; *b.* The function of the cerebellum from a clinical standpoint, Kurt Goldstein (by invitation); Discussion, Charles A. Elsberg, Henry A. Riley; *c.* Malignant hypertension. Report of results obtained by sympathectomies and rhizotomies, Alfred W. Adson, The Mayo Clinic (by invitation); Discussion, George J. Heuer, Charles A. Elsberg.
- II. EXECUTIVE SESSION—Section of Neurology and Psychiatry—Appointment of Nominating Committee.

416 BULLETIN of THE NEW YORK ACADEMY of MEDICINE

SECTION OF HISTORICAL AND CULTURAL MEDICINE—March 13

- I. **READING OF THE MINUTES.**
- II. **PAPERS OF THE EVENING**—a. Medicine of the Viking times, Anna Tjomsland (by invitation); b. Alfred Grotjahn, founder of Social Hygiene, S. M. Rabson (by invitation); c. The early historical development of permanent extension in the treatment of fractures, Lester Blum (by invitation).
- III. **GENERAL DISCUSSION.**
- IV. **EXECUTIVE SESSION**—Report of Nominating Committee.

SECTION OF PEDIATRICS—March 14

Papers from the Babies Hospital

- I. **PAPERS OF THE EVENING**—a. Antistreptolysin titer in acute glomerular nephritis, John D. Lyttle, Elizabeth L. Jost (by invitation), David Seegal (by invitation); b. Vapor pressure of normal human blood by Hill's thermo-electric method, Robert W. Culbert (by invitation); c. Observations on the nature of the serum proteins in nephrosis, Elvira Goetsch (by invitation); d. Diet, serum proteins and edema, A. Ashley Weech (by invitation).
- II. **GENERAL DISCUSSION.**
- III. **EXECUTIVE SESSION**—Appointment of Nominating Committee.

SECTION OF ORTHOPEDIC SURGERY—March 15

- I. **EXECUTIVE SESSION**—a. Reading of the minutes; b. Appointment of Nominating Committee.
- II. **PRESENTATION OF TEN-MINUTE PAPERS**—a. Treatment of fracture of the neck of the femur by wire fixation, David Telson (by invitation), Nicholas S. Ransohoff; b. 1. Transplantation of Teres Major in obstetrical paralysis; 2. Bone block operation of the hip, J. B. L'Episcopo; c. A new type of reconstruction operation for old ununited fracture of the hip, Paul C. Colonna; d. Surgical relief of low back pain accompanied by sciatica, Percy W. Roberts; e. Operation for hallux valgus, Paul W. Lapidus (by invitation); f. A new treatment of osteomyelitis, Robert E. Humphries; g. An osteoclast for osteoclasis, David M. Bosworth; h. An operation for congenital dislocation of the patella, Charles H. Jaeger; i. A frame for the application of plaster jackets, Edgar D. Oppenheimer; j. A new fracture orthopedic table, William G. Doran (by invitation).
- III. **GENERAL DISCUSSION.**

SECTION OF OPHTHALMOLOGY—March 18

- I. **INSTRUCTION HOUR, 7:00 to 8:00 o'clock**—Practical methods in orthoptic training, Truman Boyes (by invitation).
- II. **DEMONSTRATION HOUR, 7:30 to 8:30 o'clock**—a. Demonstration of new moving picture fusion training apparatus, R. Townley Paton, Mr. Samuel Auchincloss, Jr. (by invitation); b. Display and demonstration of instruments and apparatus used in orthoptics, Fifth Avenue Orthoptic Clinic assisted by Maynard C. Wheeler, Miss Stark, Miss Shackleton, Miss Behner, Miss Martin (by invitation).
- III. **SECTION MEETING, 8:30 to 10:30 o'clock**—a. Executive Session; 1. Reading of the Minutes; 2. Appointment of Nominating Committee; b. Scientific papers; 1. Orthoptic training—a phase of ophthalmic practice, Wm. Thornwall Davis, Washington, (by invitation), (30 minutes); 2. Orthoptic training in relationship to ophthalmic surgery, Avery D. Prangen, Rochester, Minn. (by invitation), (30 minutes); Discussion, LeGrand H. Hardy.

SECTION OF GENITO-URINARY SURGERY—March 20

- I. **READING OF THE MINUTES.**
- II. **PAPERS OF THE EVENING**—a. Injuries of the kidney, George F. Cahill; b. Injuries of the bladder, Alexander R. Stevens; c. Injuries of the urethra, William R. Delzell; Discussion opened by: Charles Gordon Heyd, Edwin Beer, Howard S. Jeck.

III. GENERAL DISCUSSION.

IV. EXECUTIVE SESSION—Appointment of Nominating Committee.

SECTION OF OTOLARYNGOLOGY—March 20

I. READING OF THE MINUTES.

- II. EXECUTIVE SESSION—*a.* Appointment of Nominating Committee; *b.* Presentation of memorials; *1.* for Cornelius G. Coakley by John D. Kernan; *2.* for Wendell C. Phillips by E. Prince Fowler; *3.* for Harmon Smith by E. Ross Faulkner; *Scientific Session.*

- III. PRESENTATION OF CASE—*a.* An observation on the treatment of osteomyelitis of the skull with report of a case, Clarence H. Smith; Discussion by Ward J. MacNeal, S. W. Gross (by invitation).

- IV. PAPERS OF THE EVENING—A Clinical Symposium; *a.* Two cases of early carcinoma of the larynx, and a number of cases of so-called adenoma of the bronchi, apparently cured by diathermy, John D. Kernan; Discussion by Arthur Purdy Stout; *b.* A series of cases of total laryngectomy for cancer, Robert E. Buckley; *c.* A series of cases of radical mastoidectomy with skin graft, Daniel S. Cunning (by invitation); *d.* A series of cases of radical nasal sinus operations, E. Ross Faulkner; Discussion opened by Duncan Macpherson.

V. GENERAL DISCUSSION.

SECTION OF OBSTETRICS AND GYNECOLOGY—March 26

Open Meeting in Hosack Hall

I. READING OF THE MINUTES.

- II. PAPERS OF THE EVENING—Symposium on Syphilis and Pregnancy; *a.* The role of departments of health in the control of syphilis, John L. Rice, Commissioner of Health; *b.* The relationships of syphilis and pregnancy, J. Earle Moore, Associate Professor of Medicine, Johns Hopkins (by invitation); Discussion opened by Mortimer D. Speiser, R. Gordon Douglas (by invitation); *c.* Placental syphilis, James R. McCord, Professor of Obstetrics and Gynecology, Emory University School of Medicine (by invitation); Discussion opened by Eugene S. Coler; *d.* Some problems in the management of congenital syphilis, Thurman B. Givan, Clinical Professor of Pediatrics, Long Island College of Medicine (by invitation); Discussion opened by Isadore Rosen.

AFFILIATED SOCIETIES

NEW YORK ROENTGEN SOCIETY *in affiliation with* THE NEW YORK ACADEMY OF MEDICINE

March 18

I. PRESENTATION OF INTERESTING CASES.

II. PAPER OF THE EVENING—Encephalography, C. G. Dyke, Leo Davidoff (by invitation).

III. DISCUSSION—Charles Elsberg.

IV. EXECUTIVE SESSION.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with* THE NEW YORK ACADEMY OF MEDICINE

March 28

- I. PRESENTATION OF CASE REPORTS—*a.* Thrombo-lymphangitis of thoracic duct, S. H. Polayes; *b.* Multiple aneurysms, probably syphilitic, associated with rheumatic carditis, A. Rottino, Henry J. Spencer (by invitation).

- II. PAPERS OF THE EVENING—*a.* Visceral lesions of scarlatina and related streptococcal infections, Lawrence W. Smith, Henry Brody (by invitation); *b.* Observations on the pathology of B virus, Albert B. Sabin (by invitation); *c.* Pathology of giant tuberculous cavities, L. E. Siltzbach (by invitation).

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE
UNDER THE AUSPICES OF THE NEW YORK ACADEMY OF MEDICINE—March 20

- I. Effect of Certain Agents on Cochlear Effect and Hearing, E. P. Fowler, T. W. Forbes (Introduced by J. W. Jobling).

- II. Induced resistance to transmissible leukemia in mice, C. P. Rhoads, D. K. Miller.
 - III. Effect of rapid infusion on venous pressure. A test of cardiac reserve, J. L. Caughey (Introduced by W. W. Palmer).
 - IV. Inhibition of leucogenic activity in the rabbit by certain cyclic compounds, D. R. Climenko (Introduced by R. A. Hatcher).
 - V. Blood sugar curves in normal and diabetic dogs after intravenous injection of insulin, B. N. Berg, J. McAfee, T. F. Zucker.
 - VI. Phenol red clearances in the dog, J. A. Shannon (Introduced by H. W. Smith).
 - VII. Phenol red clearance in man, W. Goldring, R. W. Clarke, C. Walsh (Introduced by H. W. Smith).
 - VIII. Effect of low oxygen pressure on the blood picture of *Necturus maculosus*, A. S. Gordon (Introduced by E. Ponder).
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APRIL

STATED MEETINGS

April 4

- I. EXECUTIVE SESSION—a. Reading of the Minutes; b. Election of Members and Fellow.
- II. PAPERS OF THE EVENING—Symposium on Headache; a. The role of diseases of the nasal accessory sinuses in headache, James W. Babcock (20 minutes); b. Ocular headache, Webb W. Weeks (20 minutes); c. Tobacco and drugs as a cause of headache, Alexander Lambert (20 minutes); d. Causes of headache in general, and as a symptom of tumors and other diseases of the brain, Frederick Tilney (20 minutes); e. Drugs and other methods of treatment, Foster Kennedy (20 minutes).

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

April 18

THE SEVENTH HARVEY LECTURE, "Pneumothorax in the Treatment of Pneumonia," Prof. Francis G. Blake, Sterling Professor of Medicine, Yale University.
This lecture takes the place of the second Stated Meeting of the Academy for April.

SECTION MEETINGS

SECTION OF DERMATOLOGY AND SYPHILOLOGY—April 2

- I. PRESENTATION OF CASES from the Good Samaritan Dispensary, Beth Israel Hospital, Seaview Hospital.
- II. MISCELLANEOUS CASES.
- III. DISCUSSION OF SELECTED CASES.
- IV. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.
Examination of cases is limited to members and their invited guests.

SECTION OF SURGERY—April 5

- I. READING OF THE MINUTES.
- II. PRESENTATION OF CASES—a. 1. Intussusception of lipoma of wall of ileum causing acute obstruction; 2. Appendix abscess with acute obstruction of terminal ileum, John J. Westermann, Jr.; b. 1. Osteomyelitis of the sternum; 2. Partial resection of the brachial artery and veins and embolectomy for embolus of the brachial artery, Joseph B. Stenbuck.

- III. PAPERS OF THE EVENING—*a.* Acute appendicitis in children, James H. Heyl, E. D. Truesdell; Discussion: Joseph H. Felsen, W. T. Doran; *b.* Acute postoperative necrosis of the liver (High temperature liver death syndrome), John E. Sutton, Jr.; Discussion: Charles Gordon Heyd, Joshua E. Sweet, M. Touroff.

IV. GENERAL DISCUSSION.

- V. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

SECTION OF NEUROLOGY AND PSYCHIATRY—April 9

- I. PRESENTATION OF CASES—*a.* Diabetic exophthalmic dysostosis, S. Bernard Wortis, Clinical Presentation; Abner Wolf, Pathological Presentation; Cornelius G. Dyke, X-Ray Presentation (by invitation); Discussion: Thomas K. Davis, Bernard Sachs; *b.* Some results of neurological surgery, Abraham Kaplan (by invitation).
- II. PAPERS OF THE EVENING—*a.* One hundred consecutive operations for trigeminal neuralgia in patients sixty to eighty years of age, Byron Stookey; Discussion: Foster Kennedy, Louis Casamajor; *b.* Modified technique for encephalography, John E. Scarff; Discussion: Leo M. Davidoff, Cornelius G. Dyke (by invitation); *c.* Treatment of brain abscess associated with suppurative encephalitis, Joseph E. J. King; Discussion: Foster Kennedy, Israel Strauss; *d.* Endocrine therapy in a case of psychic disturbance related to the menstrual cycle, William A. Horwitz, Meyer M. Harris (by invitation); Discussion: Clarence O. Cheney, Howard W. Potter.

- III. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

COMBINED MEETING OF THE SECTION OF PEDIATRICS and the SECTION OF ORTHOPEDIC SURGERY

April 11

- I. PAPERS OF THE EVENING—*a.* Operative correction of rachitic deformities, Harry Finkelstein; *b.* Vitamins in clinical pediatrics, Benjamin Kramer; *c.* Treatment of congenital dislocation of the hip, Arthur Krida; *d.* Treatment of flat feet, James W. Toumey, Jr.; *e.* Xanthomatosis, Beryl H. Paige; *f.* Significance of poor posture and its treatment, Philip B. Wilson (by invitation); *g.* Prevention and treatment of acute anterior poliomyelitis, Maurice Brody (by invitation); Discussion: William H. Park; *h.* Operative treatment of post-poliomyelitic deformities, Joseph E. Milgram (by invitation).

II. GENERAL DISCUSSION.

- III. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

SECTION OF OPHTHALMOLOGY—April 15

- I. INSTRUCTION HOUR, 7:00 to 8:00 o'clock—Anesthesia in ocular surgery, Walter S. Atkinson.
- II. DEMONSTRATION HOUR, 7:30 to 8:30 o'clock—*a.* Slit lamp studies, Milton L. Berliner, Isador Goldstein, Wendell L. Hughes, Girolamo Bonaccolto, Gordon M. Bruce; *b.* Demonstration of all cases including those to be reported; *c.* Demonstration of "The Talking Book Reading Machine," American Foundation for the Blind (by invitation).
- III. SECTION MEETING, 8:30 to 10:00 o'clock—*a.* Executive Session; 1. Reading of the minutes; 2. Obituary—Dr. Coleman W. Cutler, Alfred Wiener; 3. Nomination of Section Officers and one member of the Advisory Committee; 4. Report of Committee to formulate a program for the investigation of myopia in school children, Percy Fridenberg (by invitation); *b.* Clinical Session; 1. A case of auto blood injection in anterior chamber for tubercular iritis, Rudolf Denig (5 minutes); 2. A case of cyst on posterior surface of cornea, Mark Schoenberg, David Newman (3 minutes); 3. A case of epithelioma cured by excision and a Wheeler free skin graft, Daniel B. Kirby (3 minutes); 4. A case of anomaly of pigment distribution at the optic disc, Wendell L. Hughes (3 minutes); 5. Radiographic changes in the orbit, six cases, Irving Schwartz (10 minutes); 6. A case of glioma of the optic chiasm, Raymond L. Pfeiffer (5 minutes), (by invitation); 7. *a.* A case of blocking of the central retinal artery; *b.* A

case of hemorrhages of the retina, Samuel Forster (5 minutes), (by invitation); 8. A case of recurring vitreous hemorrhage, Richard T. Paton (3 minutes); 9. A case of optic atrophy following loss of blood, Walter F. Duggan (3 minutes), (by invitation); 10. A case of bilateral buphthalmos associated with *Naevus Flammeus*, Charles A. Perera (3 minutes), (by invitation); 11. A case of cyst of the retina, John R. Jeppson (3 minutes), (by invitation).

Moving pictures—The Eschnig technique of cataract extraction—as done by Professor W. A. Boyce of Los Angeles, W. W. Weeks.

SECTION OF MEDICINE—April 16

I. READING OF THE MINUTES.

II. PAPERS OF THE EVENING—a. Werner's Syndrome: a heredofamilial disorder with scleroderma, cataract, canities and endocrine stigmatization, Victor H. Kugel (by invitation); Discussion: B. S. Oppenheimer; b. The use of cevitamic acid (crystalline vitamin C) in the treatment of hemorrhagic diseases, Irving S. Wright, A. Lilienfeld (by invitation); Discussion: Henry James Spencer; c. Basophilic hyperplasia of the pituitary in essential hypertension, Irving H. Pardee; Discussion: Lewis F. Frissell.

III. GENERAL DISCUSSION.

IV. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

SECTION OF GENITO-URINARY SURGERY—April 17

I. READING OF THE MINUTES.

II. MEMORIAL ADDRESS—A tribute to Julius J. Valentine, Terry M. Townsend.

III. PRESENTATION OF INSTRUMENT—A self-locking cystoscopic stone or foreign body forceps with detachable handle, Irving Simons.

IV. PRESENTATION OF PAPERS—a. Experimental studies in renal arteriography, Roy B. Henline; b. Surgery of the upper ureter, Alexander Randall, Philadelphia (by invitation); Discussion to be opened by: Nathaniel P. Rathbun, Oswald S. Lowsley.

V. GENERAL DISCUSSION.

VI. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

SECTION OF OTOLARYNGOLOGY—April 17

I. READING OF THE MINUTES.

II. PRESENTATION OF CASES—Presentation of a series of cases illustrating the first two papers of the evening, Arthur B. Duel, Thomas G. Tickle.

III. PAPERS OF THE EVENING—a. The surgical repair of facial nerve paralyses, Arthur B. Duel; b. The aftercare of surgical repair of the facial nerve, Thomas G. Tickle; Discussion opened by: Isidore Friesner, J. Ramsay Hunt; c. Cribriform plate (olfactory groove) meningiomas and their early diagnosis, Charles A. Elsberg; Discussion opened by: Cornelius G. Dyke (by invitation).

IV. GENERAL DISCUSSION.

V. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

SECTION OF ORTHOPEDIC SURGERY

A meeting of the Section of Orthopedic Surgery was not held on the regular date, April 19, for the reason that the Section presented a joint program with the Section of Pediatrics on April 11.

SECTION OF OBSTETRICS AND GYNECOLOGY—April 23

(*Program arranged by the Staff of the Woman's Hospital*)

I. PAPERS OF THE EVENING (10 minutes each)—a. Complete postpartum inversion of the uterus with a follow-up and subsequent pregnancy, Ralph L. Barrett (by invitation); b. Diagnosis and treatment of missed abortions (Lantern slides), Lyman Burnham (by invitation); c. Collision tumors of the uterus (Lantern slides), Grete Stohr (by

invitation); d. Pituitary and ovarian stimulation for amenorrhea and oligomenorrhea, Harriet McIntosh (by invitation); e. Roentgenogram study of bladder and ureters associated with prolapse of the uterus and roentgenograms following vaginal hysterectomy in the same case (Lantern slides), William T. Kennedy; f. Endopelvic fascia (Lantern slides), Lilian K. P. Farrar; g. 1. Prevention of excoriation of the perineum from silver wire sutures; 2. Statistical study of hysterectomies for a period of five years (Lantern slides), Hermann Grad.

- II. DISCUSSION BY: Wm. E. Caldwell, R. A. Hurd, M. A. Goldberger, Thomas C. Peightal.
 III. EXECUTIVE SESSION—Nomination of Section Officers and one member of the Advisory Committee.

AFFILIATED SOCIETIES

NEW YORK ROENTGEN SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*

April 15

- I. PRESENTATION OF INTERESTING CASES.
 II. PAPER OF THE EVENING—The non-infectious diseases of the hips in children, E. C. Vogt, Boston (by invitation).
 III. DISCUSSION—To be opened by: M. Beckett Howorth (by invitation).
 IV. EXECUTIVE SESSION.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*

April 25

- I. PRESENTATION OF CASE REPORTS.
 II. PAPERS OF THE EVENING—a. Methods of grading mammary carcinomas compared with clinical outcome, Lawrence Sofian (by invitation); b. Studies of melanoma in tissue culture, Robert Chambers (by invitation); c. Pathogenesis of multiple tumors of the urinary tract, Russell S. Ferguson (by invitation).

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY
 AND MEDICINE—April 17

- I. Cell types found in Harding and Passey mouse melanoma grown *in vitro*, C. G. Grand (Introduced by R. Chambers).
 II. Permeability of nuclear membrane to vital stains, L. Monne (Introduced by R. Chambers).
 III. Disposal of dyes by proximal tubule cells of chick mesonephros in tissue culture, R. Chambers.
 IV. A method for titrating the protective action of antimeningococcal serum, G. Rake.
 V. Immunological relationships of strains of filterable virus recovered from cases of human influenza, T. Francis, Jr. (Introduced by Rufus Cole).
 VI. Rate of lymph flow in edematous skin of cardiac and renal disease, P. D. McMaster.
 VII. Method for determination of cardiac output in man, S. A. Gladstone (Introduced by B. S. Oppenheimer).
 VIII. Estrogenic dihydroxy compounds in urine of pregnant mares, A. Wintersteiner, E. Schwenk, B. Whitman (Introduced by H. T. Clarke).
 IX. Exophthalmos in rabbits produced by oxyquinoline sulphate, H. R. Miller, H. Taub (Introduced by G. G. Ornstein).
 Annual meeting. Reports of tellers, auditors, and officers will be read.

MAY

STATED MEETINGS

May 2

- I. EXECUTIVE SESSION—a. Reading of the minutes; b. Election of Members and Associate; c. Presentation of diplomas.

II. THE HERMANN MICHAEL BIGGS MEMORIAL LECTURE—"Public Responsibility for Health,
Thomas Parran, Jr., State Commissioner of Health, Albany

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)
May 16

THE EIGHTH HARVEY LECTURE, "The Isolation and Properties of Crystalline Pepsin and Trypsin," John H. Northrop, Member of the Rockefeller Institute for Medical Research, Princeton, New Jersey

This lecture takes the place of the second Stated Meeting of the Academy for May

SECTION MEETINGS

SECTION OF SURGERY—May 3

I. EXECUTIVE SESSION—a Reading of the minutes, b Election of Section officers and member of Advisory Committee, For Chairman, Condict W. Cutler, Jr., For Secretary, William F. MacFee, For member of Advisory Committee, Guilford S. Dudley

II PRESENTATION OF CASES—a Mediastinal teratoma Presentation of specimen, William T. Doran, Discussion John V. Bohrer, Howard Lilienthal, Robert H. Hutchinson, Jr., b 1 Acute hemorrhagic pancreatitis Drainage through gastro colic omentum Recovery, Discussion John V. Bohrer, Ralph Colp, Abraham O. Wilensky, William T. Doran, 2 Acute hemorrhagic pancreatitis with perforation of transverse colon, associated with cholelithiasis Ileostomy Drainage, Edward Raymond Easton, c Cases illustrating the paper of the evening, Lionel S. Auster

III PAPERS OF THE EVENING—a Tumors of the male breast, Lionel S. Auster, Discussion opened by Frank E. Adair, Abraham O. Wilensky, Angelo M. Sala, b A review of the established anesthetics (with analysis of deaths in New York for five years), Clifton W. Henson (by invitation), Discussion opened by Paul M. Wood

SECTION OF DERMATOLOGY AND SYPHILOLOGY—May 7

I EXECUTIVE SESSION—Election of Section officers and member of Advisory Committee, For Chairman, Max Scheer, For Secretary, Frank C. Combes, Jr., For member of Advisory Committee, John Frank Fraser

II PRESENTATION OF CASES from the a New York Hospital and Cornell University Medical College, b City Hospital

III MISCELLANEOUS CASES

IV DISCUSSION OF SELECTED CASES

Examination of cases is limited to members and their invited guests.

SECTION OF HISTORICAL AND CULTURAL MEDICINE—May 8

I EXECUTIVE SESSION—a Reading of the minutes, b Election of Section officers and member of Advisory Committee, For Chairman, Jerome P. Webster, For Secretary, Reginald Burbank, For member of Advisory Committee, Russell L. Cecil

II PAPERS OF THE EVENING—a Studies in Aneurism by William and John Hunter, Fenwick Beekman, b Quaint obstetric practises of the XVIII and XIX centuries Smellie, Burton and Scanzoni, Walter B. Mount

III GENERAL DISCUSSION

SECTION OF PEDIATRICS—May 9

Case Demonstrations from 8 to 8:30

I EXECUTIVE SESSION—Election of Section Officers and member of Advisory Committee, For Chairman, Bela Schick, For Secretary, Alexander T. Martin, For member of Advisory Committee, Harry Bakwin

II PRESENTATION OF SINGLE CASE REPORTS—a Bellevue Hospital—Tuberculous pleurisy with effusion associated with meningeal signs, Edith M. Lincoln, b Bronx Hospital—Staphylococcus empyema in a two weeks old infant cured by aspiration, Philip Cohen (by invitation), c Massive collapse of the lungs in early infancy, Bernard S. Denzer, d St. Luke's Hospital—Lung abscess with spontaneous rupture and cure,

Russell B. Scobie (by invitation); e. Roosevelt Hospital—Case of pneumococcic (type I) meningitis with recovery, Philip Van Ingen; f. Post-Graduate Hospital—Lactic acid bacillus meningitis in a new born infant, John D. Craig; g. Mount Sinai Hospital—Nodal rhythm in an eighteen months' old infant, Sidney D. Leader; h. Unusual tumor of the skull, Murray H. Bass; i. Israel Zion Hospital—Hypothyroidism complicated by diabetes mellitus, Harry M. Greenwald, William S. Collens (by invitation); j. Lenox Hill Hospital—Calcification of the choroid plexus in a four-year-old child, Jacob L. Rothstein (by invitation); k. Morrisania City Hospital—Congenital atresia of the bile ducts with erythroblastosis and kernicterus, Harry D. Pasachoff (by invitation).

THE SECTION OF NEUROLOGY AND PSYCHIATRY and THE NEW YORK NEUROLOGICAL SOCIETY
May 14

- I. EXECUTIVE SESSION—The Section of Neurology and Psychiatry; Election of Section Officers and member of Advisory Committee; For Chairman, Leon H. Cornwall; For Secretary, Abraham A. Brill; For member of Advisory Committee, C. Burns Craig.
- II. PAPERS OF THE EVENING—a. Endocrine therapy in a case of psychic disturbance related to the menstrual cycle, William A. Horwitz (by invitation), Meyer M. Harris (by invitation); Discussion: Clarence O. Cheney, Howard W. Potter; b. The investigation of taste and smell in diagnostic localization, Caesar Hirsh (by invitation); Discussion: Israel S. Wechsler; c. Pre-psychotic personality involutional melancholia, William B. Titley (by invitation); Discussion: Harry M. Tiebout; d. Heredity and environment. A study of a psychotic, George W. Henry (by invitation); Discussion: James H. Wall; e. Suicide and mental disease, Gerald R. Jameison; Discussion: Gregory Zilboorg.

SECTION OF GENITO-URINARY SURGERY

The following were elected at the April meeting of the Section: Chairman, Joseph A. Hyams; Secretary, Roy B. Henline; Member of Advisory Committee, C. Travets Stepita.

There was no May meeting of this Section.

SECTION OF OTOLARYNGOLOGY—May 15

EXECUTIVE SESSION

- a. Election of Section Officers and member of Advisory Committee; For Chairman, Westley M. Hunt; For Secretary, Charles W. Depping; For member of Advisory Committee, Marvin F. Jones.

SCIENTIFIC SESSION

- I. PATHOLOGIC EXHIBIT beginning at 7:30 o'clock in the patients' room; a. Exhibit of types of neoplasm of the external and middle ear; b. Exhibit of types of malignant tumor of the nasal accessory sinuses, G. Allen Robinson.
- II. CASE PRESENTATIONS at 8:30 o'clock—a. Presentation of cases and brief summary of end results of cases of neoplasm of the nasal accessory sinuses treated by surgery and radiation, G. Allen Robinson; Discussion opened by George A. Wyeth, J. Schwartz, D.D.S.; b. Demonstration of a device for the aid of the laryngectomized patient, James W. Babcock.
- III. PAPERS OF THE EVENING—a. Report of the acute infections of the middle ear and mastoid process of the Manhattan Eye, Ear, and Throat Hospital during 1934; their prevalence and virulence, John R. Page; b. Intrauterine and neonatal otitis, with report of a case of otitic meningitis, Frederick A. Hemsath (by invitation); Discussion by Edmund P. Fowler, Jr. (by invitation); c. Streptococcus hemolyticus bacteremia with special reference to otolaryngologic conditions, Joseph L. Goldman (by invitation), Gregory Shwartzman; Discussion by Emanuel Libman.
- IV. GENERAL DISCUSSION.

SECTION OF ORTHOPEDIC SURGERY—May 17

- I. EXECUTIVE SESSION—a. Reading of the minutes; b. Election of Section Officers and member of Advisory Committee; For Chairman, Walker E. Swift; For Secretary, Nicholas S. Ransohoff; For member of Advisory Committee, Leo Mayer.

- II. PAPERS OF THE EVENING**—a. The relation of pathologic changes of the intervertebral disks to low back pain, David Sashin (by invitation); b. Serum phosphatase in bone diseases, Aaron Bodansky (by invitation); c. Pathologic anatomy of the symphysis pubis, Charles Sutro (by invitation); d. Miscellaneous observations from the x-ray laboratory, A. Ferguson (by invitation); e. Histo-pathology of synovial tissues, E. Bick (by invitation); f. Osteoid-osteoma, Henry L. Jaffe.

III. GENERAL DISCUSSION.

SECTION OF OPHTHALMOLOGY—May 20

*In Commemoration of the Fiftieth Anniversary
(Meeting held in Hosack Hall)*

EXECUTIVE SESSION—8:00 o'clock—Election of Section Officers and member of Advisory Committee; For Chairman, John H. Dunnington; For Secretary, LeGrand H. Hardy; For member of Advisory Committee, Webb W. Weeks.

- I. HISTORICAL**—a. The New York Eye and Ear Infirmary, Bernard Samuels; b. Brooklyn Eye and Ear Infirmary, P. Chalmers Jameson (by invitation); c. Herman Knapp Memorial Eye Hospital, Arnold Knapp; d. Manhattan Eye, Ear and Throat Hospital, Herbert W. Wootton.
- II. ADDRESSES**—a. Reminiscences of fifty years in the practice of ophthalmology, George E. deSchweinitz, Philadelphia; b. Historical sketch of the Section of Ophthalmology, Percy Fridenberg (by invitation).
An exhibit of historic interest will be given by the American Optical Company, E. B. Meyrowitz Surgical Supply Co., and George Tiemann and Company.

SECTION OF MEDICINE—May 21

- I. EXECUTIVE SESSION**—Election of Section Officers and member of Advisory Committee; For Chairman, Paul Reznikoff; For Secretary, Clarence E. de La Chapelle; For member of Advisory Committee, Robert F. Loeb.
- II. PAPERS OF THE EVENING**—a. Skin test to determine recovery from typhus fever and thromboangiitis obliterans, Charles Goodman; Discussion: William H. Park, M. Brodie, Saul S. Samuels, Samuel Silbert, Joseph Harkavy; b. Allergic aspects of asthma, Robert A. Cooke; Discussion opened by Franklin A. Stevens (by invitation); c. Helium-oxygen mixtures in respiratory obstruction, Alvan L. Barach; Discussion opened by John D. Kernan.

SECTION OF OBSTETRICS AND GYNECOLOGY—May 28

Program Arranged by the Staff of the New York State Psychiatric Institute and Hospital

- I. EXECUTIVE SESSION**—Election of Section Officers and member of Advisory Committee; For Chairman, Walter B. Mount; For Secretary, Arthur M. Reich; For member of Advisory Committee, Harvey B. Matthews.
- II. PAPERS OF THE EVENING**—a. Psychiatric disorders associated with pregnancy and child-birth, Clarence O. Cheney; Discussers: Orman C. Perkins, Harbeck Halsted; b. The influence of mental attitudes in child bearing, Frederick Dershimer (by invitation); Discussers: Howard W. Potter, Max D. Mayer, Harbeck Halsted; c. The Korsakow syndrome in pregnancy (Lantern slides), William Horowitz; Discussers: Israel Strauss, Alvan J. B. Tillman (by invitation).

III. GENERAL DISCUSSION.

AFFILIATED SOCIETIES

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

May 15, 1935

- I. Insusceptibility of young puppies to distemper virus, C. A. Slanetz (Introduced by A. R. Dochez).
- II. Inactivation of diphtheria toxin *in vivo* and *in vitro* by crystalline Vitamin C (ascorbic acid), C. W. Jungeblut, R. L. Zwemer.
- III. Colony morphology of tubercle bacilli. Influence of pH of culture medium on colony morphology and virulence, K. C. Smithburn.

- IV. Conditions determining melanosis of a virus induced rabbit papilloma (Shope), J. W. Beard (Introduced by P. Rous).
- V. Placental immunity. Comparison of maternal circulating blood immunity with that of placental fluid, S. Karelitz, C. K. Greenwald (Introduced by B. Schick).
- VI. Effect of nembutal on serum cholesterol of dogs, E. H. Bidwell, F. H. Shillito, K. B. Turner.
- VII. Gonadotropic blood and urine cycles in the normal menstruating woman, R. T. Frank, U. J. Salmon.

NEW YORK ROENTGEN SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*
May 20

- I. PRESENTATION OF INTERESTING CASES.
- II. PAPER OF THE EVENING—Correlation of x-ray findings with clinical neuro-endocrine symptoms, Walter Timme (by invitation).
- III. DISCUSSION opened by Irving H. Pardee (by invitation).
- IV. EXECUTIVE SESSION.
Annual Meeting—Election of officers for the coming year.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with THE NEW YORK ACADEMY OF MEDICINE*
May 23

- I. PRESENTATION OF CASE REPORTS.
- II. PAPERS OF THE EVENING—a. Leiomyosarcoma of the uterus, L. H. Meeker; b. Filtration and secretion in the human kidney, Homer Smith (by invitation); c. The Third Dimension in pathological investigation, Jean Oliver (by invitation).

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DEATHS OF FELLOWS OF THE ACADEMY

ROWLAND, HARRY HAYNES, M.D., 235 West 76 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1903; elected a Fellow of the Academy March 7, 1912; died, May 18, 1935. Dr. Rowland was a member of the County and State Medical Societies and a Fellow of the American Medical Association.

WILLIAMS, MARK HENRY, M.D., 2736 Kingsbridge Terrace, New York City; graduated from New York University in 1870; elected a Fellow of the Academy October 7, 1886; died May 22, 1935.



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Symposium: Angina Pectoris, With Special Reference to Coronary Artery Disease¹

GENERAL CONSIDERATIONS²

EMANUEL LIBMAN
New York

In the time at our disposal this evening, it is manifestly impossible to give anything like a complete exposition of the part of the subject allotted to me. Therefore I will confine myself to clarifying some points of view, and to taking up briefly some of the special aspects that have interested me during the last thirty-five years.

What is "angina pectoris"? When Heberden introduced this designation he did not know the cause of the condition which he was describing. It is advisable, I believe, if the term is to be employed at all, to use it in that way. One should speak only of "angina pectoris due to ?," and when the cause, in a given case, is located, the expression "angina pectoris" should drop out. If I were asked to make a definition, I would say that "angina pectoris" is a term used to describe a pain and certain accompanying clinical phenomena, of a kind that lead one to believe that the causation lies in the cardiovascular apparatus of the thorax, this including the heart, blood vessels, and nerves.

¹ Presented before the Stated Meeting of The New York Academy of Medicine, March 7, 1935.

² Dedicated to Professor Anton Ghon on the occasion of his seventieth birthday anniversary.

There are many conditions that may give rise to a pain resembling, or intensifying, an already existing "angina pectoris". These conditions may be of a toxic or a weakening nature, or both. The toxic factors may be bacterial or non-bacterial in origin. Among the latter may be included such influences as tobacco, lead, metabolic disorders. The bacterial causes may be in the nature of a systemic infectious disease, or of a localized infection, such as focal infections and intoxication from the alimentary tract. Of particular interest is influenza, which at times brings about what may be called a neuromyocardial disturbance. There may be present precordial pain and discomfort, and a general feeling of weakness and fatigue, lasting even for as long as three to four years, without any evidence of myocardial insufficiency. Rheumatic fever apparently may act at times in the same way as influenza, but as it is usually accompanied by well-recognized organic changes in the myocardium and blood vessels, it will be discussed later.

Among weakening causes are obesity, anemia, malnutrition, intoxication from the intestinal tract and other organs, etc., etc. While tuberculosis may act as a sensitizing agent, it is by its weakening influence that it more commonly leads to pain in the cardiac area or to intensifying the action of another cause of such pain. Various disturbances of the nervous system may also give rise to pain resembling "angina pectoris", for example, neurocirculatory asthenia, other neuroses, worry, strain, excitement, sexual disorders. The endocrine organs play a great role, especially the thyroid gland and the ovaries. The menopause is one of the most marked sensitizers.

I can refer to but few of the various disorders in the chest, of the skin, muscles, bones, esophagus and mediastinum, that may be productive of precordial pain. It is not generally realized that diseases of the pulmonary artery may give rise to a pain resembling that due to aortic disease. Frugoni, of Rome, who has specially studied this subject, calls the "angina pectoris" due to disease of the aorta and coronary arteries, *dolor pallida*, and that due to the pul-

monary artery, dolor caerulea. This designation is of value in emphasizing the cyanosis of pulmonary artery disease.

Of particular interest are the pains due to affections of the intercostal nerves, the spine, the subacromial bursa, and other structures about the shoulder girdle. It is not generally known that pain due to a cervical "neuritis" or spondylitis may radiate, not only to the precordium, but as far down as the lower ribs. Pain due to subacromial bursitis often radiates to the precordium (more often, the upper part), spontaneously or on raising or rotating the arm. Such movements of the arm may be of value in making a differential diagnosis. Of similar value, is the method which I have described for the relief of pain due to disorders of the shoulder girdle, especially subacromial bursitis.

Spondylitis, intercostal neuralgia (neuritis ?) and disorders of the shoulder girdle, especially bursitis, may be present together with a real "angina pectoris," and may intensify the latter. I believe that the reason for the frequent coexistence of these conditions is that they essentially have the same origin, namely, a metabolic disturbance with or without secondary focal infections. It is interesting to note how often a subacromial bursitis will start to give pain within a short time after a coronary thrombosis has occurred. At times when pains are present in both arms, the pain in the left side is due to the "angina pectoris" and that on the right, to a subacromial bursitis. An interesting case in connection with what I have just been saying, is that of a man who came under observation suffering from ventricular extrasystoles. He also presented furunculosis of the chin. On the administration of calomel, both promptly disappeared. Somewhat later he complained of pain in the precordium, and pain in the lower ribs, on the left side. On examination, a patch of eczema was found in one palm. Pressure on the cervical spine, at Erb's point, reproduced the pains described by the patient. Following a dose of calomel, and the use of alkalis, all the symptoms disappeared.

The diaphragm, as is well known, may be the source of pain resembling "angina pectoris." The resemblance is often close, because when pain is produced by diaphragmatic disturbances, anxiety, palpitation and cardiac irregularities are apt to be present. Conditions in the diaphragm that may cause pain are hernia (especially the esophageal type), eventration, pressure upwards, tension and inflammation.

In the abdomen, many organs may be the seat of a pain resembling "angina pectoris." Of particular interest, are the stomach, gallbladder, pancreas, intestinal tract, kidneys and ovaries. I will refer only to the colon, especially the descending part and the sigmoid flexure. These frequently give rise to pains that radiate to the precordial area, and even the shoulder and upper arm. Such pains may be accompanied by anxiety, palpitation and arrhythmia. The whole gastrointestinal tract is a great sensitizer of the circulatory apparatus.

Patients suffering from valvular defects (particularly rheumatic aortic insufficiency in the adolescent period), acute or chronic pericarditis, aneurysm, or myocardial disease, may develop precordial pain with less or more radiation, but we do not refer to such pain as "angina pectoris." We simply say the patient has such and such a lesion and has pain due to it. Pain may also occur in connection with attacks of paroxysmal tachycardia even when not referable to coronary artery disease. It is not realized that calcific obstruction of the abdominal aorta may also cause a pain like "angina pectoris." It is important to remember that patients having any of the conditions just mentioned may suffer pain not due to them, but originating in one of the ways now to be described, the valvular defect or other lesion perhaps acting as a sensitizing agent.

The real usual causes of what we call "angina pectoris" are:

1. Hypertension. Here the pain is apt to have wide radiations (up to the side or back of the head), and, at least at

first, to be brought on by exercise. The pains are not apt to be associated with nausea and vomiting.

2. Atherosclerotic dilatation of the arch of the aorta, or more simply, Hodgson's disease. In such patients, there is present a dilatation of the aortic arch, marked left ventricular hypertrophy, and a ringing, at times metallic, aortic second sound. Even when the coronary arteries become narrowed or occluded, and the hypertrophy decreases, a pulsation can still be felt in the jugular notch and the second sound still shows some accentuation.

3. Diseases of the coronary arteries. The important conditions are narrowing or closure of orifices or lumens, and coronary thrombosis.

It is important to remember that patients suffering from narrowing or closure of an orifice, may develop sudden attacks like those due to fresh coronary thrombosis, including nausea and vomiting. Sudden death may occur. It is also to be noted that a fresh infarction may be found in the absence of a recent coronary thrombosis, due to gradual obliteration of a number of smaller trunks.

The lesions usually found in the coronary arteries are atherosclerosis with more or less calcification, or almost pure calcification. The role of syphilis is mainly in causing disease of the aortic wall with occlusion of orifices. Rheumatic fever may cause arteritis of the aorta and/or innominate artery, narrowing or occlusion of orifices, narrowing or closure of the coronary arteries by proliferation, or coronary thrombosis. Other infections cannot now be discussed.

4. The nerves. This is an important subject that has been too much neglected. It is important to keep in mind the pathway, and the state of the psyche.

5. Spasm, alone, or secondary to already existing lesions.

6. Combinations of various causes.

As you well know, there have been put forth a number of theories in explanation of the mechanism at play in attacks of "angina pectoris." At present the anoxemia theory is most prominent. There can be no question that anoxemia is the important factor in cases in which the pain is of coronary origin. But I believe that if one studies the subject according to the classification that I have just presented there is some truth in a number of the explanations that have been offered, but for different cases. I present the following for consideration:

In hypertension, per se, we must admit that strain on the wall of the aorta plays a role (theory of Allbutt). There is clinical evidence that in hypertension the role of the nervous system is important. In fact there are cases of hypertension that much resemble hyperthyroidism, elevation of the basal metabolism being absent, or only slight.

In Hodgson's disease, we encounter a number of factors. There is tension on the wall of the aorta because the blood pressure is always elevated (not as much as in essential hypertension, unless combined with it), there are atherosclerotic deposits in the walls, inflammatory areas and scars.

There is available evidence that such deposits in the wall of a vessel may be painful. When the coronary arteries are narrowed, anoxemia plays the main role.

In rheumatic fever we may have arteritis of the aorta, innominate and carotid arteries. There may be scars in the wall of the aorta. Under all these conditions the pain may well be due to an influence on the nervous pathway. I have published notes on areas of tenderness in rheumatic inflammation (verrucous) of the innominate and of the carotid arteries. In one case, in 1925, it was found that pressure upon one part of the innominate artery produced pain in the precordium radiating to the axilla. A few days later the patient began to experience spontaneous attacks, mainly at night. They persisted for about three weeks. For a number of years, pressure in the same location (which must have been scarred) reproduced the pain. This tenderness

first disappeared in 1933. That pressure upon diseased areas in arteries, even calcific ones, may be painful is amply shown by a study of tenderness and pains due to calcific deposits in the wall of the abdominal aorta. When the coronary arteries are narrowed, or closed (by proliferative inflammation, or thrombosis, or both), any pain is to be explained on the basis of anoxemia.

In syphilitic cases, the mechanism will depend upon whether or not coronary stenosis or closure is present. There can be little doubt that syphilitic disease of the aorta can of itself cause pain.

In the cases of narrowing or closure of the coronary arteries, due to atherosclerosis and calcification, we have every reason to explain attacks of pain on the basis of anoxemia. It must be remembered, however, that these cases may be complicated by other conditions.

After closure by a thrombus, anoxemia is again the explanation. As regards symptoms at the time of an acute thrombotic closure, we must consider as possible additional factors, secondary inflammation of the arterial wall, and dilatation above the point of closure. I have some interesting observations on tenderness of arteries, above acute obstructions, that I cannot now detail.

As regards the nerve kind of "angina pectoris," there is evidence to indicate that the nervous pathway may of itself give rise to pain (like any other nerves), or, in a given case, be one of the causes. One of the arguments that has often been brought forward against the coronary origin of "angina pectoris" has been that the symptoms may be out of all proportion to the extent and degree of the coronary artery disease present. This alone must make us think of the pathway. Earlier writers spoke of neuralgia and neuritis of the cardiac nerves. I have already referred to the influence of atherosclerotic infiltration of arterial walls, and of inflammatory processes and scars. There are definite cases in which an individual died in an attack of "angina pectoris," and no lesions were found. Here we must think of the nerves as well as of spasm.

Of great interest in this connection are the following observations:

1. Cases of what may be called "alternating gout," in which attacks of gout alternate with attacks of "angina pectoris."

2. The case of a man, now 82 years of age, first seen by me with his physician, Dr. Leopold Stieglitz, when he was 77 years old. He had an attack of "angina pectoris" lasting two days, with wide radiation. It came on with an attack of gout. Two years later, in 1932, he had another attack of gout, and again, "angina pectoris." The systolic blood pressure at the time of the second attack was 195. Later there were a couple of minor attacks. Diabetes supervened two years ago. On an anti-gout regimen, there have been no further attacks of gout or of "angina pectoris." Electrocardiographic changes were never evident. The blood pressure now is about 135.

3. An important case (which I have already noted in a publication in 1932) is the following:

About six years ago, I saw a delicate woman, 41 years of age, who was suffering from attacks of "angina pectoris" with wide radiation, these attacks being marked even at rest. She had a systolic pressure of 230 and a diastolic of 130. She was considered to be in a very serious condition, and I was called in to decide whether or not an operation should be performed upon the sympathetic nervous system. She had a murmur which was rather interesting and significant. It was a whistling murmur which was most marked to the left of the sternum low down, not heard as well at the apex, transmitted more to the right than to the left. Such a murmur is not uncommonly found in connection with calcification of the mitral ring. Such calcification to my mind signifies a metabolic disturbance of the type which is called "gout" or "calcium gout". It struck me therefore that the patient might be suffering from a metabolic disturbance.

She was treated medically, not with cardiac remedies but with bromides, alkalis by mouth, and later on, alkaline enemas (carbonate of soda). Within a week she lost the pain and was able to walk without any difficulty. When I saw her nine months afterwards I was informed there had been no pain in the cardiac area during the entire period. The blood pressure was then systolic 250 and diastolic 130.

For some time she suffered from a pain in the right side of the abdomen, due to calcific obstruction of the abdominal aorta (the easily palpable area of infiltration has been steadily increasing). At present she is suffering from attacks of cholecystitis, and has none of the old attacks for which I was consulted.

I believe that I have stated enough to demonstrate the importance of considering the nervous pathway in cases of "angina pectoris."

There is much difference of opinion as regards the occurrence of spasm in the coronary arteries. My own opinion is that there is enough evidence available to make us believe that it does occur. Part of this evidence comes from cases of Raynaud's disease. There is particularly one significant case on record of a patient who first suffered spasm of the arteries of one leg, followed by a visual disturbance (the spasm of the retinal vessels was actually observed), and then suffered a typical attack of "angina pectoris" with a fatal result. No lesions were found in the aorta and coronary arteries.

Feil has reported significant observations on patients suffering attacks of "angina pectoris," with electrocardiographic changes present only during the attacks. These taken together with the studies of Pearcy and his coworkers, make it appear that these findings may well be due to spasm. Pearcy found that ligation of the coronary arteries in dogs causes pain and electrocardiographic changes, which disappear directly after the compression is released. Significant in this connection are other studies made by Pearcy and later investigators, that distension of the hollow abdominal organs may cause cardiac irregularities and

alterations in the electrocardiogram. It is reasonable to infer that these results are brought about by spasm in the coronary arteries.

Another possibility must be considered. According to a hypothesis that I have been developing, any toxic focus may cause hyperemia, edema and even hemorrhage, in the various tissues of the body, and particularly where there has been any previous alteration. A toxic focus may cause spasm, particularly in the bile ducts and the gastrointestinal tract, and probably in arteries. Spasm, in turn, may cause hyperemia and edema in various tissues, but apparently of less intensity than that ascribable to toxic foci. It is necessary to make a careful investigation of the possible role of such changes, particularly in the pathogenesis of "angina pectoris."

I cannot take up the subject of combinations of various causes in individual cases. It is too extensive. Not only is there often more than one cause in the heart and blood vessels, but there frequently come into play the influence of disease of other organs (by way of general effects and more often through reflex action), and the state of the mind. I am tempted, however, to make a brief mention of one case, because it is so instructive. A man suffering from hypertension, complained of two kinds of pain. One, evidently an inverse radiation, was brought on only by walking. It radiated from the back over the left shoulder forward to the precordium. It often also radiated to the side of the head, occasionally the occiput. There were no accompanying clinical phenomena. The second pain had been felt for only a short time, six weeks, before consulting me. This pain, which was situated in the precordium, came on at rest, mainly following meals. It did not radiate and was accompanied by dizziness, which was considered as an equivalent to nausea and vomiting, the patient being hyposensitive to pain. Electrocardiographic changes were demonstrated. This second pain was interpreted as being due to coronary artery disease. Later the patient died with symptoms of acute coronary thrombosis. It is of particular interest that

the pain due to the hypertension, which was the severer pain, was a widely radiating one, and was not accompanied by dizziness.

The aneurysms of the heart that follow so often upon thrombosis of the coronary arteries are now receiving more of the attention that they deserve. Impressed by their frequency, I requested Dr. Paul Klemperer to furnish me with the statistics of the department of pathology of the Mount Sinai Hospital, for presentation at an address delivered at a meeting of the Johns Hopkins Medical Society, in February 1931. Of all the data which Dr. Klemperer kindly furnished me, I want simply to note that aneurysms of the anterior wall of the left ventricle were found in 38 per cent of all the patients in whom a large coronary trunk had been occluded. Clinically, there is present suggestive evidence in two-thirds of these cases of aneurysm. The methods that I have found to be of value need not be detailed, because I have described them elsewhere*.

On a number of occasions, during the last years, I have stated my conviction that atherosclerosis and thrombosis of the coronary arteries, and "angina pectoris" of nerve origin are largely of metabolic origin, and that we must stop considering patients from only the standpoint of the heart and arteries. They should be regarded as affected by a general disorder, of which the cardiac manifestations are but one evidence. This conception has always been considered correct for atherosclerosis in general. It is generally accepted to be in general dependent upon mechanical strain, and a metabolic disturbance.

The exact nature of the metabolic disturbance (or disturbances) is not known. Clinical experience leads me to believe that it is the same which underlies so-called gout—irregular and typical. I usually refer to it as "metabolic disturbance due to ?," or "goutiness." The expression "goutiness" is employed only in a clinical sense and has no reference to any chemical theory, for all studies of recent

* Proceedings of the Inter-State Post-Graduate Medical Association of North America, for 1932, page 409.

years point away from the uric acid theory of gout. It seems likely, as Murchison and others long ago claimed, that a disturbance in liver function is significant in the development of the "gouty conditions." Of importance, perhaps, is a disturbance in lipoid metabolism. On another occasion, I will give the evidence that supports such a view. I might mention an observation of importance, made by Dr. Joseph Milgram, who has kindly permitted me to cite it, in advance of his proposed publication. In a case of subacromial bursitis of the supraspinatus tendon, there was aspirated 4 to 5 c.c. of a greasy, completely ether soluble material. It proved to contain 5 per cent of calcium, and 10 per cent of cholesterol, the remainder being lipoid in nature. As you know, analyses made in cases of subacromial bursitis usually show 95 per cent of calcium, and practically no organic matter. Dr. Milgram's observation is so significant, because it was carried out in an early case.

There are many causes of disturbance of liver function. Some of the important ones are heredity, the absorption of toxic substances from the intestinal tract (due largely to improper methods of eating), and the influence of the mind, especially enforced mental activity and worry. It is my opinion, based upon clinical experience, that the development of focal infections is largely dependent upon hepatic dysfunction. I have already indicated one of the ways in which focal infections may favor the development of "angina pectoris."

One is most impressed, perhaps, by the probable metabolic origin of much of "angina pectoris" of nerve origin, and atherosclerosis and thrombosis of the coronary arteries, by a consideration of the conditions with which they are often associated. They belong largely to the disorders which often occur in "goutiness." Some of these are, eczema, urticaria and angioneurotic edema, arthropathies, bursitis, tendinitis, spondylitis, various forms of neuritis, renal calculus, hemorrhoids, asthma, gallbladder disease, furunculosis, pruritus, thrombophlebitis. Diabetes, which has always been considered to be related to the "gouty" diathesis, is not infrequently noted.

Many years ago, Allbutt made a careful study of the family histories of patients under his care in Leeds. In a paper entitled, "Series and Families of Disease," he listed the disorders which he found associated with the "angina family." They correspond, in the main, to those that I have just stated.

Because of the observations just cited, and other considerations, I decided, some years ago, to apply certain methods that had been found of value in the so-called gouty conditions, to the treatment of cases of "angina pectoris." Some of the conditions in which good results had been obtained by me are, sigmoidal spasm, gallbladder disease, spondylitis, subacromial bursitis, sinusitis, hemorrhoids, and certain cases of eczema, urticaria and pruritus.

The main parts of this method of therapy (which does not interfere with the use of other remedial agents), are the use of calomel (sometimes blue mass), the administration of alkali by mouth and rectum (enemas of carbonate of soda) and the rectal implantation of *B. coli*. The details of the method, and a discussion of variations of it, I must leave for another occasion. The diet is not limited a great deal, the main considerations being that food should not be rapidly ingested, and that the stomach should not be distended.

I am not sure that a complete explanation can be given of the favorable results that have been obtained, in a goodly number of the patients treated along these lines,—in some, really striking. The following suggestions are offered:

In the first place, liver function is improved, and that removes a generally toxic influence. Diminution in intestinal putrefaction increases myocardial efficiency. This is clear to anyone who has observed that patients not the subject of any cardiovascular disorder, may tire on climbing stairs, and have no difficulty after the administration of a dose of calomel. Besides, the improved condition of the intestinal tract results in a diminution or disappearance of the tendency to spasm that has so bad an influence on the circulatory system.

There is a likelihood that alkalinization and perhaps the whole method of therapy makes nerves less sensitive. Occasionally a very good result goes hand in hand with a reduction in blood pressure. There are some cases of hypertension that are apparently brought about by the absorption of toxic products from the intestines. In one case, in which a very good result was obtained, as regards pain on walking, the use of calomel, alkalis and implantation of *B. coli*, lowered the blood pressure from 190 to 120. At first, the patient could not walk half a block. Later he was able to walk two miles with ease. He died later suddenly (in a foreign country,—of his old coronary thrombosis?). I might note here that Dr. Louis Katz of Chicago, in his experiments on induced anoxemia, found that it required more exertion to bring on pain, when large doses of alkali were administered.

It is not at all uncommon, in cases of coronary artery disease, to find a low basal metabolism. In such cases, real results may not be obtained until thyroid therapy is instituted. This experience indicates that a further investigation is needed of the mechanism of the results obtained by total thyroidectomy and by the use of other methods, the effect of which is apparently due to reduction of the basal metabolism.

Since 1919, on a number of occasions, I have drawn attention to the probability that thrombosis in the coronary arteries occurs largely because of a general thrombotic tendency. This I have called thrombophilia. By this term is meant a tendency to thrombose, independent of any disease near the vessel, and of any preceding vascular inflammation or traumatism. Occasionally such a tendency seems to be hereditary.

The occurrence of thrombosis in the coronary arteries seems to have a relationship to the metabolic disturbance of which I have spoken, and the exact nature of which we do not know. The reason why some patients with the metabolic disturbance have a tendency to hemorrhage, and others to thrombosis, is not known. It is an important subject for study. The idea that there exists a tendency to thrombose,

and that it may have a relationship to metabolic disorders, is not new. On looking up the literature, I found that as long ago as 1883, von Recklinghausen stated that there exists an individual tendency to thrombosis, independent of any circulatory disturbance, due to such metabolic disturbances as diabetes and gout.

Much of what I have said is meant to serve as the basis of a program for the wider study of the subject of tonight's symposium, with special reference to prophylaxis. I cannot refrain from quoting from Pascal: "One often writes things that one can only prove in that one encourages the reader to think about them himself."



THE TREATMENT OF THE PATIENT WITH ANGINA PECTORIS*

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The most important basic fact for the physician who is called upon to treat a patient suffering from angina pectoris to realize is that angina pectoris is not a disease, but a symptomatic picture which may be caused by a quite divergent basic pathology. He must also recognize the fact that it is but rarely that he is able to strike directly at the basic pathology concerned in angina pectoris, but that he must in most instances treat the symptoms and signs which are in turn dominantly modified by the personality, emotional status and individuality of the patient, even much more so than in most disease conditions. Physical factors are often much subordinated to emotional ones in this complex and the social obligations and psychic reactions of the individual sufferer are usually of equal if not even greater import than anatomical ones. This is preponderatingly a syndrome in which the treatment of the patient outstrips in its importance the management of basic pathology.

As in most other medical conditions there are, however, exceptions to this general rule. These must each be also fully determined and appreciated by the physician. Where the syndrome is produced by syphilitic disease, which appears in but about 4 per cent of the cases in Eastern North America, this basic pathology must of course be directly attacked. The same is also probably true in at least some cases of gouty origin and perhaps also in other conditions. This is, however, the rare exception and not the rule in angina pectoris.

Hence it is that treatment if successful must be also two-fold, one type directed to correct or to modify a basic causa-

* Read before the Stated Meeting of The New York Academy of Medicine, March 7, 1935, as part of a symposium: Angina Pectoris, with Special Reference to Coronary Artery Disease.

tive pathology which varies much in individual cases and secondarily to prevent or neutralize inimical emotional factors which strikingly vary also in each individual. We must in every instance comprehend and treat the highly individualistic physical, and especially the emotional characters of each patient.

This syndrome does not permit of a standardized scientifically based treatment, for the individual patient is not standardized but is a very pleomorphic biological and emotional integer.

The subject with angina pectoris is notoriously one sensitized particularly to many emotional factors, often of extremely varied character. Every clinician well realizes that emotional factors and stresses are quite as frequent exciting factors of the syndrome as are the varied physical and chemical conditions which also underlie it.

This is particularly strikingly manifested in those factors which incite or precipitate the attack. An association of emotional and physical exciting factors is almost certain to precipitate attacks in susceptible individuals. We may also say that given the basic mechanism of the condition, emotional states quite as certainly set the process in gear as can physical factors.

Thus it is that treatment, preventive, palliative or curative, must make full acknowledgement of these facts. One individual must differ in these respects as widely as individuals may differ one from another in any other plane, and so also it is certain that each person may differ at different times and under different emotional and physical states as much as in any other of the varied grades of life.

As a rule, and with most persons, emotional states may be more readily controlled and directed than physical ones. We must recognize also that emotional factors often very largely control the physical pictures. Few other organs in the body more strikingly illustrate this fact than does the heart. Anger, fear, love, surprise, even intense joy more strikingly and profoundly influence the heart rate and rhythm than most pathological or physical factors of which

we know. The same is also true of arterial, venous and capillary tension which vary more quickly under such stimuli or sedation than from any anatomically pathological pictures; as to the influence on capillary flow in particular, note the striking blush of embarrassment, the sudden and intense pallor of anger, the appearance of sweat, heat or cold of the skin, nausea and diarrhoea, and the enuresis of emotional origin and the like.

It is a fact that the danger of an attack of angina is in very large part coincident with the activity of the symptomatic manifestation. With the subsidence of the pain and anxiety of the attack, danger rapidly wanes. It is therefore most important that we study and attempt to evaluate these factors which are so necessary in the mechanism to prevent or lessen the angina. To a very large extent, prevention and relief are accomplished by similar type factors or measures, but in direct opposition. Of all these by far the most important is REST. The most complete form of rest, is, of course, sleep. Except in certain cases in which sleep appears to precipitate attacks, probably in accordance with the theory of Allbutt, sleep is one of our most efficient preventives of the onset of attacks. Sleep may be produced in adequacy or even in super-abundance by placid mental states, by the use of such sedatives as the bromides, chloral, the barbiturates, alkaloids of opium, and by many other drugs, among which we must not forget alcohol.

Monotonous reiteration, the reading of poetry, music and the like are all sedatives of real value in selected cases of angina pectoris. Music, usually one of our best sedatives, may, however, in certain individuals so stir the emotions, through keen appreciation, as to precipitate attacks. Mild exercises, intelligent physio-therapy are highly productive of rest in many instances. Electricity may be also employed and in by no means a small number of instances such measures may be found far more effective than drug sedatives.

Diversions, games, congenial conversation, even when some physical effort is entailed often act most effectively as

sedatives. Elimination of worry, however, if it may be accomplished, is often of tremendous value. I have accomplished the elimination of attacks in a good many instances by allowing the patient to return to congenial work. Control of environment, hospitalization when domestic conditions are trying and vice versa, sending patients from the hospital to enjoyable home surroundings has broken the attacks also in a good many instances. It must be always recalled that in the application of the rest element in treatment of cases of angina, the individualism of the patient must be especially considered.

From the mere physical standpoint, rest is most completely accomplished in bed. Many persons, however, particularly those of a restless and introspective character, do very badly on bed rest except when it is given for but limited periods of time and for definite purposes as in exhaustion and the like. Few cases are permanently improved by prolonged bed rest, except where coronary thrombosis has taken place when the physical rest is essential for anatomical reasons, as, so that the scar of the infarcted areas may be healed.

Control of environment is possible in many circumstances where the physician is the family doctor and when he fully retains a proper relationship of entire confidence of his patients, now, unfortunately, a somewhat rare occasion.

Under environment it is the function of the physician to arrange for play and diversion as much as it is to assist the patient to adjust his business and social obligations to affairs which he may carry on, not only without detriment but often with real benefit.

Climatic adjustment is in very many instances a matter of very great importance. Angina pectoris is relatively rare in the tropics and it is less in the subtropics than in the cold and temperate zones. Where it is possible for the patient to spend perhaps only the inclement months in a tropical or subtropical climate, it may be wisely advised. Some patients do better in moist warm climates, such as in Florida and southwestern California, Spain, in India and

the like. Others do best in dry warm climates, as in south-eastern California, Arizona and New Mexico, in Egypt, or in parts of Old Mexico.

Altitude may also be advantageously employed not only as regards temperature, but also as regards winds and air pressure. Thus it is that the therapist must familiarize himself with many geographical factors, with conditions at sea and the like; all are matters of great import to the patient with angina pectoris. Exercise requirements must be also studied and in considerable part this considers also altitude, days of sunshine and heat. As a general rule patients do not thrive at the higher altitudes and many are at their very best at sea level or on the coast.

The problem of vasodilatation has a good deal of bearing on these matters of climate and altitude. As a general thing patients do not do well at the higher altitudes, and though some are best at medium altitudes the matter as a rule must be worked out experimentally. Allergy, and sensitivity to prevailing foods and to plant life becomes of importance. This especially applies to those numerous persons of marked allergic sensitivity, for these agents also tend toward increasing attacks or bring immunity to them.

As a general rule it will be found that conditions favoring vasodilatation are desirable. Warmth, comfort and congeniality of surroundings are matters of very great import in this respect. Properly adjusted hydrotherapy and physiotherapy of other types are all matters of importance in these respects and much of the benefits achieved through the agency of the sedatives may act through these channels. The value of such drugs as the bromides, chloral, the barbiturates, of paraldehyde and finally of the opium group act in this way. The judicious and timely employment of this class of drugs can be most fittingly applied through many of these agents. Alcohol is one of our standby substances for this purpose and many patients find that they can much mitigate and diminish their attacks by the use of alcohol, especially when administered at bed time or given with the meals. This fact has been fully recognized by many modern

writers on the subject, but it is particularly forcefully emphasized by the observation of Heberden, who first described the condition and who rated alcohol as second only to the opium group in point of its efficiency in this respect.

Lauder Brunton by introducing the use of the nitrites for the relief of acute attacks of the syndrome conferred an ineffable boon on most of the sufferers from angina pectoris. In the average case there is no other drug so prompt and efficient as the nitrites in the abortion of an acute attack unless it be accompanied by a coronary thrombosis in which instance the nitrites are usually of little avail. The nitrites given as a routine in the prevention of attacks is also tremendously beneficial in a very high percentage of cases, as every physician knows.

The control and elimination of the sense of pain is one of the major purposes of treatment in angina pectoris. It has already in large part been suggested in what has gone before but it is exceedingly important for the physician to realize that in most cases with the elimination of pain the danger of the attack is also much done away with. Suggestion and autosuggestion are often of tremendous value in the control of pain in many medical conditions but they are well nigh useless in true angina pectoris.

The control of pain is considerably enhanced by the maintenance of a chronic state or condition of sedation such as we may bring about through the action of the vasodilators, but relief of the suffering of the immediately acute attack can, as a rule, be accomplished except when thrombosis of a coronary has taken place when powerful sedatives and analgesics are demanded, morphine, opium or some of their combinations. Alcohol in massive doses is recommended by Heberden, but we now have other much more quickly acting and more efficient drugs for this purpose.

In most cases the combination of the use of the opiates in acute and severe attacks on a background of other soporifics and sedatives as chloral, paraldehyde or the barbiturates are often well attended. Mere vasodilators such as the

salts of theosine and caffeine as a rule are not very effective for the relief of pain except as preventatives and unless these drugs are combined with routine exhibition of pure sedatives they still have the unfortunate effect of causing considerable nervous and mental stimulation which, in turn, acts to excite the numerous factors which play so large a role in the precipitation of attacks.

The value of these drugs in actual coronary thrombosis or coronary narrowing is, however, very important, as most of us know. It is a curious fact however that many prescribe theosine, caffeine sodium benzoate, metaphylin, theominal, and at the same time cry out against the use of tea and coffee, which are so much more agreeable ways of introducing these very useful drugs.

Some physicians lay great stress on the importance of the dietetic treatment of angina pectoris. As a rule this is very ineffective and not a well based theory except in those instances in which an allergic factor may be introduced through food. In the main it is the quantity of food taken, and the speed of its ingestion which are the more important factors. It is usually the over distention of the stomach and the pressure exerted by the over distended stomach on the diaphragm which precipitates the attack, and not the character of the foods as such. To a certain limited degree, however, this statement may be qualified where there is a salt retention of importance. The salt rich foods, therefore, may require limitation of ingestion. In gouty cases the nitrogen rich foods must be eliminated. In allergic cases, as so many are to tobacco for example, this drug or condiment must be much more limited or entirely eliminated.

For the same reason foods which excite excessive flatulence and colonic distention, as cabbage, turnips, beans, the fats and the like may be wisely much curtailed. Constipation and all manner of abnormal fermentative processes within the gastro-intestinal tract are also conditions which may become of importance, but their role is usually much exaggerated by the lay public and the lay medical advisor.

Though the syndrome depends on actual cardiac pathology without probable exception, acting in most cases in conjunction with a sensitized nervous and sympathetic arc, there are other pathological conditions which may play a role in the occurrence of angina pectoris. Thus emphysema, adhesive pleurisy, pulmonary fibrosis, chronic bronchitis and bronchiectasis, pulmonary and bronchial neoplasms, and the like may become important determining factors.

The same is also true of some endocrine defects as in thyroid disease, either of the hypo- or the hyper-active types. Adrenal disease also probably plays some part in many cases and probably also the sex glands and pituitary disturbances as well. The very interesting and suggestive work which Crile has done in adrenal isolation has impressed the writer greatly.

It is, I am sure, apparent that the treatment of angina pectoris may be a very complex problem indeed, and it is further apparent that intimate individual study is the essential of success in the management of any case.

All too little attention has been paid in the past to the preventive treatment of angina pectoris. Every clinician of experience knows that coronary artery disease, aortitis and most of the conditions which lead on to the production of the syndrome are highly hereditary ones. The syndrome is a definitely familial one, and yet how very little attention has been paid to its prophylaxis.

The records of most active practitioners show all too clearly that heredity is a very important factor in the occurrence of angina and in most families even the specific type of the syndrome is to a considerable extent preserved. How very wise it would be to advise against marriage among members of anginal or coronary disease families, and where children are born to such unions or in such families to teach them from their early years the building up of self control of the emotional tendencies and the like. Prophylactic training against the development of early arteriosclerosis might be easily cultivated, and the early training in ath-

letics, in the habits of study and in the selection of occupation, diversions and the like might readily build up a resistance against the disease rather than to develop a predisposition by environment, diet, habits and customs of life which are well known to favor the evolution of the pathology back of the syndrome.

The time allotted to me this evening for the discussion of the treatment of the patient with angina pectoris is very brief for so important a topic but I should much fail my purpose did I not give some time to the presentation of the operative methods of treatment.

Very briefly stated operations in this condition are done for two quite different purposes. The first to be considered is those procedures which are primarily designed to relieve the suffering and the second is those which are performed with the hope of relief of basic pathology. Both groups of operations are of comparatively recent origin and consequently few clinicians have thus far seen enough conclusive results on which to base a sound prognostic opinion.

Probably the most simple of the procedures designed to relieve the distress of the syndrome, for we all meet with cases in which medicines alone fail us in this respect, is through injection of the nerve roots, substantially by means of nerve block. Probably the most satisfactory method is that of Swetlow. It succeeds in its purpose in the hands of skilful operators, in a very considerable number of cases. It is rarely however permanent in its final results and the danger of death is not averted by this method.

These same criticisms apply in the main also to the operations which involve section of the sympathetic trunks of the neck or the removal of the cervical sympathetic ganglia. There are several operations of this type under study, perhaps the most successful are based on the primary work of Jonnesco. In some cases these methods give great relief of the agony of the syndrome, they do not relieve pathology however, many cases recur and even immediate relief is problematic. Mackenzie among others promptly pointed out that to some extent the danger of death was increased

by these operations, in as much as the warning of pain was blocked and the patient was therefore tempted to undertake more effort because of this fact. My own observation however does not entirely bear out this statement since it appears that in at least some instances a diminution in the nervous reflex exciting attacks is also gained by the operation. Thus far the results have not justified the operation except in cases where the agony was so great that almost any risk was worth the taking. Clinicians in general appear to feel that these operations should be reserved for severe cases only, instances in which very inadequate relief only could be won by rest and by medical treatment.

Of the second group of surgical attack of the disease in which an attempt to remove the causative pathology is made, undoubtedly the most popular method at present is total or subtotal thyroidectomy. That thyroid pathology may play a weighty role in many cases, I think is beyond doubt but that it is universal remains to be proven by results and not theory. Subtotal thyroidectomy has greatly relieved some cases in my observation, in a few it has produced an apparent cure, at least for the time being.

I have not seen enough cases in which total thyroidectomy was performed to give a personal opinion, what I have seen has given me no encouragement, nor has this operation equaled the result achieved by the subtotal method, in my opinion.

Still a newer operation attempts to correct the condition by the establishment of an adventitious circulation. One wonders if it will be more successful than that accomplished in adhesive pericarditis.

For a very few remaining moments I now wish to take up in a somewhat more specific manner the treatment of the individual in the acute attack of angina pectoris. The first object should be to produce a vasodilatation as promptly as possible. This is most readily accomplished by the very prompt administration of nitroglycerine or of amyl nitrite. A little experience with each individual case will soon show

which of these two is the more individually effective. Nitro-glycerine is best given in solution, but fresh tested tablets, preferably hypodermic ones are thoroughly satisfactory. They can be crushed by the teeth and swallowed, it is far more satisfactory than the attempt to hold the tablet under the tongue. When amyl nitrite fumes are inhaled the capsule should be crushed in the handkerchief and a concentrated gas inhaled if the best result is expected. Neither of these drugs is dangerous in itself, though to withhold them is often highly so.

If prompt relief of pain is experienced, no repetition is indicated, but if otherwise it may be repeated or a general sedative taken, such as chloral, a barbiturate, amyral or the like. The second object is to give a sedative which is also a slower acting vasodilator. Morphine is best but for obvious reasons it is not usually wisely so used. A good drink of a strong alcoholic is often very efficacious. Rest, physical and emotional, and if possible a short period of sleep is very desirable. A very definite effort to self control should be made a part of this treatment, for fright, terror or anger prolong and tend to reexcite the attack. Do not take food, exercise, or engage in any emotional effort until after a short or longer period of rest has been taken.



AN EVALUATION OF THE SURGICAL TREATMENT OF ANGINA PECTORIS*

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A critical appraisal of the different forms of surgical treatment of angina pectoris should properly include a detailed consideration of the theoretical aspects of each type of operation, as well as of the actual results obtained. The time at our disposal is so relatively limited that any discussion of the anatomical and physiological basis must be brief and quite inadequate. Those of you who wish a more comprehensive knowledge of this aspect of the problem may profitably read the excellent series of papers by those authors to whom I shall refer in a moment.

There are three types of operation that have been proposed and tried for the relief of anginal pain: (1) section or removal of a small or large part of the cervical sympathetic nerves or ganglia on one or both sides; (2) section of, or injection of alcohol into, the upper thoracic sympathetic ganglia or the corresponding dorsal nerve roots; and (3) total removal of the thyroid gland. I wish to discuss these briefly in that order.

In 1916 Jonnesco¹ of Bucharest first adopted a suggestion made by Francois-Franck seventeen years earlier. Franck was convinced on the basis of certain experimental observations and his review of cervical sympathectomy performed for various conditions, that these nerves served a sensory function and conveyed pain impulses from the heart to the central nervous system. Jonnesco performed widespread excision of the sympathetic nerves in the neck of a patient who had syphilitic aortitis and angina pectoris, and secured complete relief of pain. Despite this, the operation did not become popular, and in 1923 Coffey and Brown² of California suggested a much simpler procedure for the same pur-

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pose, namely, removal of a smaller portion of the sympathetic nerves or ganglia on one side only. Within the next five or six years a great many patients were subjected to this procedure or some modification of it, and when it became clear that unilateral resection was often ineffective, some surgeons returned to the more radical and extensive operation of Jonnesco which became known as cervico-thoracic sympathectomy, and consisted of the removal of all three cervical ganglia and the first dorsal or stellate ganglion on both sides. As will appear later, this bilateral operation was based upon beliefs now thought to be erroneous.

In 1933, White³ summarized the reported cases subjected to one or the other type of sympathectomy, and reported the results as follows: Of one hundred and eighteen cases subjected to upper cervical sympathectomies (Coffey and Brown), 48 per cent had a satisfactory result. Of sixty-six cases subjected to the complete cervico-thoracic sympathectomy (Jonnesco), 53 per cent had a satisfactory result. The operative mortality was from 7.5 to 12.5 for the simpler operation, and about 20 per cent for the complete Jonnesco procedure.

I am sure I need not remind you of the difficulty inherent in this method of appraising results. The degree of enthusiasm of the author may lead him to classify as highly satisfactory a result which impartial observers would regard as far less so, and it is a not uncommon experience, as Dr. Levy⁴ has pointed out, to find the tables and conclusions of certain authors at wide variance with the case reports upon which they are based. In other words, even if one accepts the author's own report of his cases, it becomes impossible in many instances to agree with his classification of results. Acknowledging this difficulty, it is interesting to find one of the more enthusiastic of the earlier advocates of sympathectomy speaking thus in 1933:⁵ "It seems to us that the results in all of the procedures enumerated and so frequently practised fail to give a sufficiently satisfactory percentage of good results to let us feel that we are on the right track in treating this disorder. . . . It is true also that

the risk of the major operation is something to be considered. We have convinced ourselves that the figures for the various procedures on the sympathetic apparatus in the treatment of angina pectoris are not sufficiently hopeful to justify continued minor perfections in the technique already at hand. Certainly the changes brought about are only of a quantitative measure, and complete relief has rarely been given. It would appear that the basic considerations must be somewhere faulty."

I believe it is correct to state that cervical sympathectomy has fallen into almost complete disuse because increasing experience indicated that the results did not justify the procedure. I have written to a number of those who were at one time interested in this form of treatment, and practically all who have replied indicate that they are no longer advocating it. Since there is now excellent reason for thinking that the operation was based upon incorrect beliefs, it seems to me unnecessary to consider it further.

In 1925, Mandl⁶ in Europe, and in 1926 Dr. George Swetlow⁷ of this city, reported groups of anginal patients who had been remarkably relieved of pain by the paravertebral injection of alcohol into the dorsal nerve roots on the left side. In these earlier reports the procedure was not standardized as to the number of nerves to be injected; in Swetlow's cases the decision depended in some measure upon the areas of hyperesthesia in the skin that could be discovered by careful protopathic and epicritic sensory tests; from the studies of Head and of Mackenzie, it was thought that these areas would indicate the dorsal root ganglia that were being irritated by the passage of pain impulses from the heart. In the eight patients first reported by Swetlow, alcohol was injected into from two to nine dorsal nerve roots; prompt and satisfactory relief from pain was secured in every instance. In a paper five years later, he reported a group of twenty-two patients, with relief in eighteen of them.

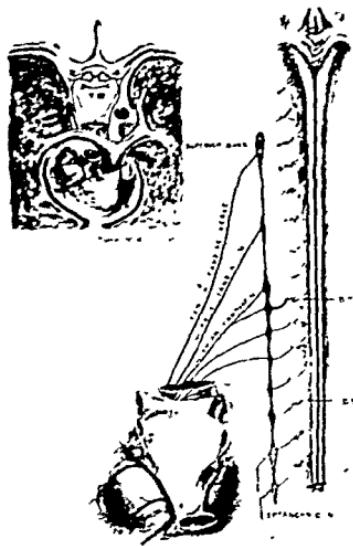
Between 1926 and 1930, observations of fundamental importance in this connection were reported by a number of

different observers^{8, 9, 10, 11}, who demonstrated the existence of postganglionic fibers leaving the upper two to four thoracic ganglia and running into the posterior cardiac plexus. These were demonstrated in laboratory animals and in man, by anatomical and physiological methods. If it could be shown that these fibers carried sensory or motor impulses which played an important part in the production of anginal pain, it would immediately become obvious why cervical sympathectomy had been unsuccessful, for no operation performed through the neck could sever these structures, and their persistence would account for the continuance of anginal pain after even complete cervical sympathectomy.

With this possibility in mind, James White of Boston and his collaborators³ performed a series of experiments upon dogs. As an indicator of the occurrence of pain, they employed the method of Sutton and Lueth,¹² passing a ligature about the left anterior coronary artery and leading it out through the wound, which was then closed. Brief traction upon this ligature would cause occlusion of the artery, and the resulting ischemia of the heart muscle invariably caused characteristic changes in the behavior of the animal, stiffening of the limbs, a marked increase in the rate and depth of respiration, and considerable restlessness. In twenty-one animals this was used as an index of the effectiveness of various neurosurgical operations for interrupting the pathways of cardiac pain, or of impulses thought to correspond with pain impulses in man. Their results may be summarized briefly as follows: Cardiac pain was not transmitted by the vagus nerves; bilateral section of these nerves did not alter the characteristic response of the animal to coronary arterial occlusion. If afferent impulses from the areas to which cardiac pain is usually referred were blocked by section of the upper intercostal nerves on both sides, pain was not prevented. Bilateral resection of the stellate ganglia might diminish, but did not block, all sensory stimuli from the heart; a distinct sensory response was obtained in five of six animals in which this test was made.

On the other hand, bilateral removal of the sympathetic ganglia from the stellate down through the fourth thoracic ganglion, or section of the upper five posterior dorsal nerve roots, appeared to interrupt all sensation from the heart. They showed that bilateral excision of the stellate ganglia did not completely destroy the motor pathways to the heart. The upper thoracic ganglia (below the stellate) send important motor as well as sensory fibers directly across the posterior mediastinum to the posterior cardiac plexus. If these are stimulated electrically, the heart rate may increase as much as 58 per cent.

These statements concerning the anatomical and physiological relationships of the heart and the sympathetic system will perhaps be clarified by reference to the illustration. This photograph is of a drawing in a paper by Dr.



James White which appeared in August, 1933.¹³ The heart and spinal cord are viewed from the back, and the position of the heart has been shifted to the left for purposes of illustration. The heavy black line represents the sympathetic trunk, beginning with the superior cervical ganglion and showing the successive ganglia down to the

fifth dorsal. The lines connecting these ganglia with the posterior cardiac plexus represent in order the superior, middle and inferior cardiac nerves running from the corresponding sympathetic ganglia, and below these the fibers mentioned as having been described between 1926 and 1930 by a number of different observers. These run directly across the posterior mediastinum and apparently carry both sensory and motor impulses. The middle and inferior cardiac nerves carry both afferent and efferent stimuli, but the superior cardiac nerve is thought to be purely motor. It is important to recognize that all of the cardiac fibers concerned in the conduction of pain impulses converge in the upper thoracic ganglia and then enter the spinal cord over the white communicant rami and the posterior roots. According to our present conceptions, there are no white communicant rami joining the upper cervical ganglia with the spinal cord, so that impulses travelling from the heart over the middle and inferior cardiac nerves must travel downward in the sympathetic chain and be transmitted through the four or five upper dorsal ganglia. It is clear from this diagram why even complete removal of the cervical sympathetic ganglia may fail to relieve anginal pain. Even if all three cervical ganglia are removed, there still remain these nerves running to the five upper dorsal ganglia which may convey pain impulses. These can be completely interrupted by blocking the ganglia, the rami or the spinal roots.

These anatomical and physiological premises have been tested in a total of forty cases at the Massachusetts General Hospital suffering from the severest forms of anginal pain. Thirty-six of these had alcohol injections into the dorsal nerve roots or ganglia, and four were subjected to surgical resection of the upper four thoracic ganglia. Of the total number, there was complete or almost complete improvement (90 to 100 per cent relief) in more than half, and marked improvement (estimated at 50 to 90 per cent relief) in another 25 per cent. There was slight improvement (estimated at 25 to 50 per cent) in 8 per cent, and failure, due to technical difficulties in placing the alcohol precisely, in

about 12 per cent. There was no operative mortality from the paravertebral alcohol injections, but White estimates that there will be an inevitable mortality of about 25 per cent from surgical resection of the upper four thoracic ganglia.

Dr. Robert Levy, whose excellent paper upon this subject in 1931⁴ led me to write him several weeks ago, has been kind enough to send me the following informal report upon the Presbyterian Hospital series of cases of alcohol injection for the relief of anginal pain. There have been about thirty cases in all; in approximately 40 per cent there has been a considerable measure of relief, varying from complete disappearance of pain to a reduction in the number and intensity of attacks. In another 30 per cent lesser degrees of improvement were noted, and in the remaining 30 per cent the procedure was classified as a failure. These figures are approximate, and represent Dr. Levy's impressions rather than a careful analysis of his cases. I would ask you to bear in mind that the differences in results at different clinics are not to be construed as invalidating the anatomical and physiological studies of White, but rather as indicating differences in experience and in technical skill. Several competent surgeons have told me, for example, that they are unable to perform the injection with any degree of success, and Dr. White tells me his technique is acceptable to himself only when he can perform injections on the average of about once a week.

Swetlow speaks of the relief in his patients as lasting for a number of months, but both White and Levy have found that there was no recurrence of pain in their patients who were relieved, and some of these have been followed for five or six years.

When we realize that the patients subjected to paravertebral alcohol injections have been selected purely on the basis of severity and frequency of pain, that they were critically ill, and that life was almost insupportable, these results are most impressive. There are, however, several objections that must be mentioned. The chief of these is the

appearance, in about one-half to two-thirds of the cases, of a severe alcoholic neuritis of the infiltrated intercostal nerves, leading to moderate or severe hyperesthesia and pain. This may last from several weeks to several months, and in a few cases is quite distressing. The second objection is the technical difficulty of injecting the alcohol with precision, since it has to be done blindly. The injection of 5 c.c. of alcohol results in an area of fibrosis about 1 cm. in diameter, and if this is to be effective, it must involve the exact area desired. In several reported instances, the alcohol has touched the pleura or has been injected into the pleural cavity and has led to transient pleurisy. In general, however, it must be regarded as a safe surgical procedure, without serious permanent complications, and without operative mortality.

There is one question which inevitably and quite properly comes to mind in this connection. Is it dangerous to abolish pain in these patients? Is anginal pain truly a warning, the removal of which will permit the patient to continue harmful exertion beyond the proper point and thus cause death? This question was vehemently debated in connection with the operation of cervical sympathectomy, but so far as I am aware, no clear evidence was ever brought forward in proof of the belief that patients would be worse without their warning pain. Similarly, I know of no evidence to indicate that alcohol injections have hastened death by permitting patients to indulge in excessive activity. Actually, the question is one that is very difficult, and perhaps impossible, to answer, for the patients who have been subjected to these procedures are precisely those to whom sudden death may come at any time. If they die suddenly some weeks or months after operation, who can assert with any confidence that the end has been hastened or postponed by the treatment? Actually, it is true to say that in most, if not in all, cases, there are substitution symptoms which serve as warnings just as effectively as did pain before its removal; such symptoms as a sense of emptiness in the epigastrium, oppression in the chest, or slight constriction of the throat.

I come now to the third and last of the surgical methods of treatment, namely, removal of the entire thyroid gland. I believe the largest experience with this method of treatment has been acquired by Levine and Cutler at the Peter Bent Brigham Hospital, and by Blumgart and his collaborators at the Beth Israel Hospital, in Boston. Most of you are doubtless familiar with their papers and with the slightly divergent views which they champion. Within the past two weeks I have had the privilege of discussing this matter at length with Doctors Blumgart, Davis and Riseman at the Beth Israel Hospital, with Doctors Cutler and Levine at the Peter Bent Brigham Hospital, with Doctors Weiss and Faulkner at the Boston City Hospital, and with Doctors Paul White, Howard Sprague and James White at the Massachusetts General Hospital. While my brief remarks upon the subject are based largely upon published reports, they are doubtless colored by my recent discussions with these men and by my own experience with the method in New Haven.

There is general agreement that during or immediately after such operation, the majority of patients are relieved of anginal pain. According to Blumgart, this instant relief is due to section of or trauma to sympathetic nerves in close proximity to the thyroid gland, and pain will return when the nerves regain their function. According to Levine and Cutler, the immediate relief is due to an altered response of the heart to adrenalin, and they have shown that the response of the cat's denervated heart to adrenalin is altered by removal of the thyroid gland from such animals. Blumgart, however, has shown that if only one lobe of the thyroid be removed from a patient who has angina with bilateral radiation of pain, there is immediate relief of pain on the operated side only. It is difficult to believe that this unilateral relief could be due to altered sensitivity to adrenalin circulating in the blood stream. Furthermore, Blumgart has shown that the response of the heart rate and blood pressure to intravenous injections of dilute adrenalin in man are precisely the same after thyroidectomy as before, until the basal metabolic rate falls to very low levels, which

usually requires three or four weeks. It is his conception that the immediate relief is due to cutting of nerves, and the permanent relief is associated with the lessened demands upon the heart attendant upon the development of hypothyroidism. His views seem so logical, and the evidence supporting them seems so unequivocal, that one is tempted to agree with them wholly, but there are many questions still unanswered, and further experience alone will provide the solutions that we seek.

What results have been obtained? I believe it is impossible at present to make any fair or final answer. Unquestionably some patients have been completely relieved of pain, and a larger number have been greatly helped. There have been a considerable number of failures, and a small number of operative deaths. Some patients have been relieved of pain, only to suffer the severe discomforts of myxedema, while others oscillate back and forth between myxedema and angina, depending on the dose of thyroid extract administered. So far as actual figures are concerned, Blumgart¹⁴ reports that eight of twenty-five patients secured complete relief from pain lasting up to the time of publication of his paper, which was from three to eighteen months after operation. Five were improved, four had no relief, and six had recurrence of anginal pain after from three to nine months of complete relief. These figures in themselves seem to indicate that the physiological basis for the procedure is probably not fully understood. If relief of pain is actually due to lessened demands upon the heart associated with hypothyroidism, why should only eight of twenty-five patients secure lasting relief when hypothyroidism is produced? Why should six patients be completely relieved of pain, only to have it return six months later while the basal metabolism was still at a low level? Why do some patients secure relief from pain only when the metabolic rate falls to low levels, and have recurrences of pain if the metabolism is elevated even slightly, while others secure relief in a similar fashion and yet have no recurrences of pain even if the metabolism is raised to the pre-operative level by means of thyroid extract? The evidence

in some respects is not only confusing, but also contradictory, and if the reported observations are correct, there can be little question that the evidence is still far from complete. It is possible that Cutler is right in believing that thyroidectomy has influences upon the circulation other than, and independent of, those which can be measured in terms of the basal metabolism. Until further studies can be completed, it seems impossible to state dogmatically the full reasons for the benefit which occurs in about one-third of the cases.

Moreover, there are certain surgical hazards which cannot possibly be ignored. The chief of these are sudden death within a few hours of operation, postoperative pulmonary complications which may lead to death several days later, injury to the recurrent laryngeal nerve, and parathyroid insufficiency. Unless these patients are treated with extreme care, the operative and postoperative mortality is apt to be rather high.

It was natural to believe, when this operation was first proposed, that serious results might follow the deliberate induction of surgical myxedema. Among these were mentioned the so-called myxedema heart, in the sense of a causal condition precipitating circulatory failure or angina pectoris, mental changes similar to those often associated with spontaneous myxedema, rapid development of arteriosclerosis because of the high level of cholesterol in the blood serum associated with hypothyroidism, and the anemia which is so often a part of spontaneous myxedema. These possible developments have been kept clearly in mind by Blumgart, and a large number of patients have been carefully studied to see if these conditions would develop. Up to the present time there is no evidence that they have been important. Despite this, the potential and actual disadvantages of thyroidectomy are numerous, and there is complete agreement among all those with whom I have talked that a certain number of patients have been made worse by the operation, not with respect to pain, but with respect to other symptoms. The discomforts and crippling effects of myxedema are too numerous and serious to be ignored, and

the final state of some patients after operation is most pitiable. It seems pertinent to indicate that with the exception of the Beth Israel group, those with whom I have discussed the matter are far less enthusiastic today than they were a year ago.

These I believe to be the chief matters for consideration in attempting to appraise the value of these surgical procedures individually and with respect to each other. I have already indicated that there is now a general belief that operations upon the cervical sympathetic trunk are physiologically unsound and not warranted in the light of present knowledge.

A comparison of the other two methods may be attempted, but any conclusions now reached may well be modified by future experience. It should be kept clearly in mind that the two have quite different aims; the injection of alcohol has as its objective the destruction of nerves which convey pain; in a sense it aims at producing permanent local anesthesia. Thyroidectomy, on the other hand, theoretically aims at removing the discrepancy between the demands of the body and the ability of the heart to meet those demands. Anginal pain is thought to be the expression of this discrepancy, and since the ability of the heart cannot be increased in terms of the coronary blood flow, it would seem logical to decrease the demands of the body, and thus remove the cause of the pain. There is no apparent reason for questioning the physiological basis for the first procedure; there are several reasons for questioning the current explanations of the relief afforded by thyroidectomy. Until we know beyond all question exactly what thyroidectomy does, the only comparison that is valid is of the results achieved by the two methods, both good and bad, and of the obvious advantages and disadvantages of each. Accepting the reported results as published or as reported verbally to me, the percentage of relief following alcohol injections is higher than that following thyroidectomy, at least in the Boston groups. Further advantages of this procedure are the absence of operative mortality, the absence of any per-

manent ill-effects, the short period of hospitalization (usually three or four days, as compared with several weeks for thyroidectomy), and the possibility that other methods may be tried in case of failure, without the patient's condition having been altered for the worse. The disadvantages have already been indicated; they are chiefly three: the technical difficulty of injecting the alcohol accurately, the neuritis that often follows it, and the fact that relief is strictly limited to the side on which injection is performed. . . . In favor of thyroidectomy one may say that it affords great or moderate relief in one-third to one-half of the patients, including those who have bilateral radiation of pain. So far as I know, this is its only actual advantage as compared with the other procedure. The disadvantages are numerous and have been mentioned briefly; they include operative and postoperative death, recurrent laryngeal nerve paralysis, parathyroid insufficiency, myxedema, and the disturbing fact that we are still uncertain of the physiological basis for the operation.

A final question may profitably be asked. Is there a place for either or both of these therapeutic procedures in the treatment of anginal heart failure? In my opinion there is most certainly a place for alcohol injections. I believe the present evidence indicates that thyroidectomy will also find a permanent place in the treatment of angina, although I share the prevailing belief that at present it should be reserved for those patients in whom pain makes life intolerable or prevents the earning of a livelihood. The criteria for the selection of suitable patients are not yet sufficiently known, and it is possible that it will ultimately be reserved for a few severely ill patients who have bilateral radiation of pain, who have hyperthyroidism in addition to angina, or who have failed to respond to alcohol injections. The injection of alcohol would seem to me the method of first choice because of the high incidence of success and its freedom from the distressing conditions which may follow removal of the thyroid gland.

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DISCUSSIONS

DR. ALEXANDER LAMBERT: That was an extremely interesting and instructive summary that Dr. Marvin just finished; and one which I followed with great pleasure. It was on a subject in which I had long been interested, and I had followed closely the literature as it had appeared. As he summed up the thyroid operation for angina pectoris, it reminded me of the old Greek aphorism that was said of opium, "opium cures a disease, and produces a disease." I think this surgical procedure does the same. The elder Kocher, years ago, found that total ablation of the thyroid left a condition in which the several forms of thyroid medication could not prevent myxedema, and with it the myxedematous heart.

I do not see that it fulfills the entire requirements for the relief of angina to remove a gland because its secretion is a stimulant of the sympathetic system, but leaves the sympathetic system itself intact. The pains of angina are brought about by disturbance of the normal equilibrium between the two balancing parts of the autonomic nervous system, and the three chief conditions which bring on attacks of angina are emotion, exertion and exposure to cold. These three conditions are sympathetic drives to redistribute the blood in the body. The heart normally is under the control of the vagal system, and the blood vessels under the sympathetic. When a sympathetic drive occurs requiring redistribution of blood, a heart in good condition increases its output per beat, but a heart out of condition cannot do this immediately, or even at all, and must endeavor to meet the demand for more blood by an increase of rate to give an increase per minute. Pain occurs when the sympathetic system demands a greater increase of cardiac function than the heart can supply. Cutting out the thyroid gland to diminish one of the chief stimulants of the sympathetic mechanism leaving an intact sympathetic system is only a partial answer to the problem of cardiac pain production.

There is one method of bringing the autonomic system back into equilibrium that has recently been brought more and more into prominence, and which has been proven effective in Europe for many years, but which in this country is held in very little repute. That is the carbonic acid baths as given at Saratoga Springs, New York, at Nauheim, St. Moritz, and other places abroad. These baths, as has been recently shown by Bornstein, Budelmann and Rönnell, do return the control of the heart to the vagal system, as shown by diminution of pulse rate, and by increasing the power of the heart to deliver an increase of blood through each beat of the heart. It has also been shown by Voigt that hot plain water baths increase the cardiac output, but chiefly by accelerating the heart through the sympathetic system, and increasing the output by increasing the output per minute. This is the basic result of those baths.

I was asked to speak upon the effect of tobacco in angina, and the clinical effect of tobacco in the ordinary life of the patient with angina. Clinically, patients having angina pectoris, and who use tobacco are more prone to attacks, and more prone to increase the intensity of their pain during the attack, than those with angina who do not use tobacco. That is a curious fact, but it is so. Some patients can smoke with impunity, with no injurious effect, even though they have angina. Other patients have to give up smoking. I have seen patients who have given it up and returned to it who dropped dead after their first cigar. I have seen only five of such accidents, but this has been enough to have attracted my attention.

Harkavy and Sulzberger reporting their tobacco experiments find in the thrombo-angiitis patients, that over 80 per cent showed a marked sensitization to tobacco in the skin. In the 319 control smokers who were without the thrombo-angiitis there were only about 20 per cent who showed this tobacco reaction. About one-third of these also showed a family history of asthma, and hay fever. It is also interesting to note that practically one-half of the smokers who showed skin reaction to tobacco, also showed the symptoms of angina pectoris. In the other controls there were only about 12 per cent who showed a skin reaction to tobacco. This reaction is not due to nicotine. The skin reaction due to nicotine appears in but a very small number of patients. The reaction is due to some extract from the tobacco itself which has not been separated. It may show in some patients, in some certain forms of tobacco only, or in some one brand of cigarettes, but not in others, and be entirely peculiar to that person. It is here a matter between a patient and his brand of tobacco. Other patients showed skin reaction to all forms of tobacco tested.

It has long been noticed that nicotine paralyses the synapses of the sympathetic nerves between the pre-ganglionic and post-ganglionic fibers. As you know, the action of the autonomic nervous system is produced by the secretion from the nerve endings themselves of certain chemical sub-

stances, the parasympathetic nerves secreting acetylcholin, and the sympathetic nerves, a substance called by Cannon, sympathin.

Nicotine and atropine prevent the action of these secretions in these nerves. Atropine, for instance, does not act directly on the nerve endings of the parasympathetic, and nicotine does not act directly on the nerve endings, but they act chemically on the acetylcholin, or sympathin as secreted, and prevent their action. Nicotine thus inhibits the action of the sympathetic nerves as cardiac accelerators, and also diminishes the conductivity and contractility of the myocardial fibers in the cardiac ventricle.

Thus when nicotine does affect the sympathetic action of the heart, it has a direct action on the nerves governing the contractility of the ventricular muscles.

Regnier has shown, studying Tschermak's test by pressing the carotid sinus in the neck, that in patients suffering from arteriosclerosis, or those having myocardial degeneration, the heart is excessively sensitive to disturbance of the nervous reactions produced by this pressure test.

It seems that in the senile heart, as we may call it, there is an increased sensitivity to its nervous mechanism, and it may well be that the disturbances of the mechanism causing the sensation of pain in the heart, are more often due to the use of tobacco than is usually acknowledged.

It is wise, therefore, to take seriously the possibilities following indications of the disturbance in the synapses between the post-ganglion and pre-ganglion fibers, by nicotine.

DR. MARCUS A. ROTHSCHILD: I have been asked to confine my discussion to the question of the mechanism of angina, especially the anoxemic hypothesis. In all probability too much emphasis has been laid on the purely mechanistic idea of the production of pain in angina pectoris. We probably have to go back to something more

fundamental and think, possibly, in terms of the humoral theory of the transmission of nerve impulse.

I do not personally believe that the pain in angina pectoris is due entirely to a disproportion between the amount of work asked of the heart to perform and the amount of blood the muscle receives. There is a nerve element in the whole process. There are many reflexes which will induce the reflex, as I should like to call it, angina pectoris. For example, simply cooling a single arm of a susceptible individual, or by lowering the temperature of the room to a certain degree. In other people, a distended stomach, 2 or 3 glasses of water; in others, performing a limited quantity of work will induce the attack. Some individuals may walk up three flights of stairs in their own home without an attack, but will be unable to walk two blocks in the street. It is actually not the number of foot pounds of work performed that induces the attack:—there are other elements involved.

We were interested in attempting to produce the attacks by means of induced anoxemia. We felt that if the segments of the coronary system were narrowed that by inducing a general anoxemia we might induce a local anoxemia in that area of heart muscle supplied by the narrowed vessel. It was thus assumed that this area of heart muscle would receive an inadequate supply of oxygen and nutrition. We induced the anoxemia by having the patient rebreathe with a sufficiently large rebreathing apparatus and CO₂ absorbing chamber so that the cerebral effects would be reduced to a minimum and would not antedate the general anoxemic effects. Briefly, we succeeded in inducing pain in 18 out of 24 subjects diagnosed as having coronary disease. The attacks were identical in nature with those the patient spontaneously complained of; i.e., if the patient spontaneously began with pain in the elbow, the induced anoxemic attack began with pain in the elbow. We have performed this test on several hundred occasions and can report no harmful results. In two instances the attack persisted after the patient was removed from the tent and it required a vasodilator in order to remove the attack.

Associated with the production of these attacks by means of anoxemia we found in a small percentage of cases changes in the electrocardiogram, but in a certain number of normal individuals—normal as far as we could determine—similar changes were found.

It is an interesting fact, however, that after the patient has had an attack of coronary artery thrombosis, many of the cases lose their pain. We have tried to interpret this on the basis that the diseased vessel being completely occluded, the area of heart muscle supply to this vessel being thrown out of circuit, no pain reflex could arise from that area. The reappearance of pain would seem to indicate that another branch of the coronary system was being involved. We are at present investigating this phase of the subject.

Dr. Kissin continued this work on the skeletal muscle and found the same general principles to be true. In the normal individual performing a certain amount of work with his fingers, subjecting him to anoxemia, he could do less work and pain would follow if the work were persisted in. It seems interesting that the skeletal muscle in normal individuals gives a pain reflex while it is impossible to produce the pain in normal heart muscle by means of any grade of anoxemia which we have been able to produce, and we have been close to six volumes percentage. The lines of investigation in this work may throw some light on the mechanism of a certain number of cases.

I do not believe that anoxemia is the single explanation of all cases of angina. I think it is necessary to go very deeply into the metabolism of the muscle and attempt to learn how anoxemia for example brings about the reflex. It is not purely the lack of oxygen. There is some chemical process involved similar to the type of neuro-chemical process involved with the induction of attacks of pain by the cooling of an arm or by an emotional state.

DR. JOHN WYCKOFF: Mr. President, Ladies and Gentlemen: I think we have been very fortunate to hear these three papers. I cannot discuss Dr. Marvin's paper, but I would like to say, as did Dr. Pool, that I never heard a more masterly, thorough or well-weighted discussion of a controversial subject. The Academy, I think, has honored itself tonight in naming Dr. Libman a benefactor of the Academy. I wonder if the profession realizes how much a benefactor he has been for a great many years to the profession at large? The subject on which he spoke so very ably tonight is one of his great benefactions. It was, of course, due to the work of Dr. Libman and the work of Dr. Herrick of Chicago that coronary thrombosis came to be identified in our minds with angina pectoris in a large number of cases. There is not any one who could present the subject to us in such a masterly way as he has.

There are two or three things which he mentioned that I would like very briefly to touch upon. He spoke of the fact of multiple thrombi and the tendency of individuals to have such multiple thrombi. This subject has interested some of us working at Bellevue. Dr. Irving Graef and Dr. de La Chapelle have been particularly interested in this phase of the subject. It has been rather a difficult thing to study. They have felt that hearts in which a thrombosis had occurred in the ventricle should be eliminated because of the fact that an embolus might break off from such a thrombus and thrombi found elsewhere might not be spontaneous thrombi, but due to embolism.

During the last year or two, ten hearts have been studied in which a coronary thrombosis had occurred without any ventricular thrombus. Nine of these ten hearts show that there is a thrombus elsewhere in the vascular system. Three show more than one coronary to be involved. In two of the cases there was thrombosis of the aorta; in one a thrombus in the right auricle; in two there was, besides coronary thrombosis, thrombosis of the pulmonary artery; in one there was renal and splenic thrombosis besides coronary thrombosis.

All of this is very interesting and bears out Dr. Libman's observations. He also spoke of the fact that not all patients having coronary thrombosis have pain. In the last 23 cases studied by us that have died after their attack and have been autopsied, only nine had severe and typical anginal pain. Six of them had epigastric distress, but this was not the typical anginal pain so frequently associated in our minds with coronary thrombosis. Four of these patients had no other symptoms than the symptoms of shock. All 23 of the patients, however, (none of whom died immediately during the attack) did have dyspnoea.

I think we are always very fortunate to hear from Dr. Brooks, particularly when he talks on the treatment of any illness. He always keeps his feet so firmly on the ground.

There are two or three things that I think those of us who take care of patients with heart pain should bear in mind, and one, which Dr. Trudell spoke of as being so necessary to patients having tuberculosis, is a constant spirit of optimism. These patients not only have a serious disease which very frequently is on an organic basis, but they have a disease, the symptoms of which are greatly accentuated by mental trauma and nothing can do more harm to the patient than to handle his psychology improperly. It seems to me that too many doctors are unwilling to take the responsibility, and I think it is the doctor's responsibility, of being optimistic and letting people feel that things are not quite so bad as they perhaps are.

I also think that this is a disease in which a doctor must have a certain sureness of touch. He must not fumble. I think these simple things Dr. Brooks has brought out very well. I would also like to put in my little word for alcohol, in spite of the fact that Dr. Lambert is on the platform, and say that I know of hardly any drug more useful in the handling of patients who have this symptom than the proper use of alcohol.

I might say just one word about the difficulty which sometimes arises in making the diagnosis of coronary thrombosis, because of the onset of rapid heart action.

When a coronary is thrombosed and there is a sudden development of anoxemia, not infrequently there develops a paroxysmal tachycardia which is frequently taken for, and frequently is, a symptom of coronary thrombosis. The reverse is true. Sometimes a patient with a heart which is nearly normal will develop an attack of rapid heart action, for example, an attack of paroxysmal tachycardia, and with the attack will develop a great deal of precordial pain. It does not have to be a great deal of precordial pain to be very confusing. Of course, one is a very serious condition and the other is not very serious. I think we should always bear in mind when we see a patient with a sudden attack of rapid heart action that he need not necessarily be having an attack of coronary thrombosis. I think of late our minds have been moving along that line and sometimes such a diagnosis is made a little too frequently.



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HUTCHINSON, ROBERT HAMILTON, Jr., M.D., 166 West 87 Street, New York City; graduated in medicine from the College of Physicians and Surgeons in 1905; elected a Fellow of the Academy March 1, 1928; died June 21, 1935. Dr. Hutchinson was a member of the County and State Medical Societies, and a Fellow of the American Medical Association and the American College of Surgeons. He was Assistant Professor of Clinical Otolaryngology in the Post-Graduate Medical School and Junior Surgeon to Bronx Eye and Ear Infirmary.

TYSON, CORNELIUS JOHN, M.D., 37 East 64 Street, New York City; graduated in medicine from Bellevue Hospital Medical College in 1912; elected a Fellow of the Academy November 6, 1919; died June 28, 1935. Dr. Tyson was a member of the County and State Medical Societies and a Fellow of the American Medical Association. At the time of his death Dr. Tyson was president of the medical board of St. Vincent's Hospital and director of its medical division. He was consulting physician to French and Southside Hospitals.



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BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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JOHN HUGHLINGS JACKSON *

FOSTER KENNEDY
New York

I have been honorably instructed by this Academy to remind us all that this year represents the hundredth anniversary of the birth of a very great figure in medical science;—I refer to John Hughlings Jackson whose name is familiar to you all as having first described and explained the nature of focal convulsions. As a very young man I had the honor of knowing Jackson, then a consulting physician to the National Hospital in London.

We are still too near the 19th Century to be able properly to appraise it but many now are beginning to realize that this Century in England represented a Periclean age in which great poets sang and great novelists wrote; in which natural law began to be understood and applied to the material needs of man. We have so inherited the amazing mental innovations then instituted,—they have become so much the warp and woof of our own mental lives that we are hardly aware of how those men changed the world. We read Darwin's writing and are inclined to think "this is old stuff" without quite perceiving that, like Aeolus, Darwin caused a new wind to blow through the murk of notions that we inherited from the middle ages. Of the same band of prophets is Hughlings Jackson, who might

* Read before the Stated Meeting of The New York Academy of Medicine, April 4, 1935.

no pain at all be present. The usual location of pain from involvement of the different sinuses with, of course, any combination, depending upon whether one or several sinuses may be involved is as follows: The frontal sinus usually causes pain right where it is located in the forehead and almost always limited to the side involved. In passing, I would like to call attention to the accompanying tenderness being greatest on pressure on the roof of the orbit mesial to the supra-orbital notch and to the fact that pressure on the supra-orbital nerve always produces pain and is no sign of sinusitis. The maxillary sinus, on the other hand, is more apt to cause pain above the eye than in its real location, although it is often enough present in the upper jaw. It is particularly felt in the upper teeth on a jar to the body, such as induced by stamping the heel on the floor. To bring in tenderness again, the infra-orbital nerve suffers somewhat as the supra-orbital nerve does in misguided attempts to elicit tenderness in maxillary sinusitis. There is only a small area of the anterior wall of the maxillary sinus available for pressure just lateral to the ala naris. The pain with sphenoidal sinusitis is more variable, probably due to the adjacent spheno-palatine ganglion through which pain may be felt at very diverse locations. Typically it is in the occipital region of the involved side, but may be in the vertex, or ear, or behind the eye of the involved side. Sphenoidal sinusitis is frequently accompanied by a psychic depression as well as headache. The ethmoid cells should be considered as divided into an anterior and posterior group. Involvement of the former gives rise to pain between the eyes chiefly but often in the frontal region also. The posterior group more usually causes pain behind the eyes or in the vertex. However, since the ethmoids are rarely involved alone, pain arising from their inflammation is usually overshadowed or accompanied by the pain due to involvement of the sphenoid in the posterior group and the frontal or maxillary sinus or both in the anterior group.

Pain may arise from various conditions affecting the sinuses which may be classified as follows:

Acute and chronic inflammation, due to infection, the most common group.

Mechanical means such as a slight engorgement of the mucosa at the orifice of a sinus not permitting air to enter and the absorption of the air contained, causing a decreased pressure in the cavity and engorgement of the lining membrane. This is admirably described by the late Dr. Sluder but the frequency or importance of it as a cause of headache is sometimes disputed. Pressure within the nose from a swollen mucosa whether inflammatory or due to an allergic reaction should come under this heading as should the presence of a foreign body or tumor.

Scars within the nasal or sinus cavities at times produce considerable pain.

Pain following irradiation of the bones containing the sinuses, due probably to a resulting periostitis may occur. I know of one man, who after being treated for papillomata in the maxillary sinus by radium, had such severe and persistent pain, that he considered having an operation on his Gasserian ganglion eight years after treatment.

I have tried to describe the more usual types of headache associated with sinusitis and will describe some of the atypical forms which are very variable and numerous. This is especially true in involvement of the sphenoid or posterior ethmoid cells. Here the pain may be a diffuse headache or pain localized to almost any part of the head or face, even the lower jaw. At times, the pain with maxillary sinusitis may be referred to even a single normal tooth. This is not surprising when one realizes that the roots of some of the upper teeth raise prominences in the floor of the antrum. It is rare for the pain to be felt on the opposite side of the head to the involved sinus but this may occur.

I have purposely omitted any detailed attempt to explain the variability of the locations of the pain in sinusitis anatomically, partly because in some instances I would be unable to do so.

Pain very like that produced by sinusitis may be caused by a great variety of other conditions. Prominent among them are dental lesions, particularly impacted third molars, although their favorite referred pain seems to be in the ear. Eye lesions, particularly errors of refraction may cause headaches similar to those of sinusitis, the particulars of which will be described by Dr. Weeks. The headaches with nephritis and high blood pressure may be confusing. At the onset of various febrile diseases, such as typhoid fever, or typhus, headache may be the chief symptom and be misleading. With influenza, this headache is frequently due to a concomitant sinusitis. In migraine, the differential diagnosis is usually aided by the accompanying visual symptoms or nausea and by the irregularity of its occurrence; also its propensity to be relieved instead of increased by pressure. Frontal sinusitis has been closely simulated by trichinosis with particular invasion of the orbicularis palpebrarum muscle. In another case an arterio-venous aneurism within the orbit was nearly operated upon for sinusitis with orbital cellulitis. Headache with intracranial lesions is less apt to simulate that of sinusitis but the variability of pain with sphenoidal involvement may lead to confusion. Neuritis and myositis particularly of the trapezius may simulate sinusitis and indeed be secondary to it.

Headache may be attributed to other causes and turn out to be due to sinusitis. An example of that is the case of a young woman who was rendered unconscious by a fall from a horse giving her a definite concussion. A persistent headache followed this and occasioned much worry and distress and finally ceased after the cure of a low grade maxillary sinusitis.

The treatment of headache is to be discussed by Dr. Kennedy and so I only wish to bring out the point that in cases where the headache is due to sinusitis, the best way to effect a cure is to cure the sinusitis rather than adopt any palliative measures.

Although sinusitis may at times be readily diagnosed by a description of the headache accompanying it, this symptom is so often atypical and even absent, that the diagnosis should not be made without a complete examination of the sinuses, for overflow of pus or mucus from the normal opening of a sinus, diseased mucosa, around its orifice, eliciting tenderness, transillumination. Radiographs or even diagnostic irrigation may be, in obscure cases, advisable to eliminate sinusitis. Topical cocaineization of the sphenoid region may relieve spheno-palatine neuralgia when little or no disease of the sphenoidal sinus can be demonstrated.

Sinusitis may be responsible for a comparatively small percentage of all headaches. However, it would be a mistake to omit an examination of the sinuses in endeavoring to find the cause of obscure headaches.

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OCULAR HEADACHE *

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Ocular headache is well described as that acute discomfort in and about the head that directly or indirectly results from organic or functional disorder of the visual apparatus.

It has been thought that this is a reflex pain due to a stimulation of the endings of the nasal branch of the ophthalmic division of the fifth cranial nerve being reflected along other branches of this nerve, that changes in the eyeball are felt as pain in the region of the brow by way of the supra-orbital nerve and pain felt deep in the skull is reflected along the dural branches of the fifth nerve. Michaelson's study into the pain of visceral reflex origin concludes that the mechanism which underlies the ciliary headache is analogous to that which gives rise to referred visceral pain in other parts of the body, more particularly that ciliary headache arises from ciliary dysfunction in the same way as angina pectoris arises from cardiac dysfunction. In his study Michaelson showed that ciliary muscle contraction, relaxation, and fatigue could stimulate this pain and produce a dull aching throb (43), a sharp knife-like pain (24), a heavy tired feeling (10), and a tight, gripping feeling (8) (as seen in occipital aches of hyperopic astigmatism). He found that the degree of pain in a visceral reflex depends on the changing nervous excitability of the nervous system, local and general: locally, at the particular level of the cord, being sensitized by afferent stimuli; and generally, due to a central nervous system more sensitive from toxic conditions, overwork, lack of sleep, mental worries, and sexual disturbances.

Fenton brings forward the rôle of the sympathetic in ocular headaches as follows. The network of vessels in and about the eye is accompanied by a delicate network of sympathetic fibrils controlling vascular tone. Among these.

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vegetative nerves are interspersed end organs of sensation, which report mechanical pressure, edema, hemorrhage, passive or active hyperemia, as well as the pressure due to infection and inflammation, whether superficial or exudative. Local toxins (bacterial, chemical, resultants of body wastes, fatigue, or perverted metabolism) have similar irritant effects upon these sensory terminals. In general, then, ocular headache from, in or about the eye is representative of local pathology which is often actuated through the sympathetic system, while it is reported to the area where the headache is felt through the fifth cranial nerve and its connections. Perceived within or about the cranium, it may, by reflex stimulation of the sympathetic at the perceiving area, set up local vasomotor disturbances within the dural envelope, which may greatly aggravate the intensity of the original headache. Conversely, conditions within the brain or along the sympathetic or sensory nerves may activate perceptory mechanisms within or about the eye, thus producing irritations or congestions which appear local.

In the average ophthalmological practice about 30 to 60 per cent of headaches are of functional origin. Next to visual defects this headache is the commonest symptom to bring the patient to an oculist's office. Or the patient is sent for an eye examination by the physician who finds no physical cause, or by the neurologist whose findings do not explain the headache.

There is no doubt but that headache due to ocular functional or organic states can be ruled out by a careful and thorough ophthalmological examination, especially if, first, defects be discovered on a complete local examination, and if, secondly, one considers the immediate physical surroundings, the general physical and neurological conditions present, and the original background, physical status, inheritance, etc.

The location of headaches of ocular origin is supra-orbital, 75 per cent of all bilateral frontal headaches being due to eyestrain associated with the use of the eyes. In

order of frequency, the sites of election for these headaches are supra-orbital, deep orbital, fronto-occipital, and temporal regions. The unilateral supra-orbital ache is usually not due to eyestrain. But it is often most difficult to say that a given headache is primarily or secondarily ocular in origin. Where accommodative or focusing effort goes beyond the reserve of the ciliary mechanism a frontal headache is apt to result, whereas when the muscles adjusting the eyes to single binocular vision are overtaxed occipital or cervical headache may ensue.

As to the character of the ocular headache, there is no pathognomonic feature, but it is suggestive, especially when associated with other signs or symptoms of ocular disturbance. This headache may be constant or periodic, of long duration or of shorter periods, or occur at regular or at irregular intervals. The personal and family habits often are of great value, though usually one finds that ocular headaches are associated with eye use. We cannot get away from the fact that we are dealing with functional conditions where we have a great variation not only in the powers of different individuals, but also at different times and under different conditions in the powers of the same individual. An error of refraction which will cause much discomfort of various sorts in one person will in a subject with a more stable makeup produce no symptoms worthy of notice.

The local factors involved in the production of ocular headaches are:

1. Disturbances of refraction and accommodation.
2. Disturbances of ocular motility.
3. Disturbances of retinal function.
4. Congestive states in and about the eyeball.

As Lancaster aptly describes it, in refractive and accommodative dysfunctions we have to consider: the lens with its elastic support (zonular fibers); the ciliary muscle which controls the tension of this elastic support and so regulates the anterior curvature of the lens; the nerve sup-

plying the ciliary muscle, its primary center, the adjoining and interconnected groups of motor cells and their nerves and muscles which are associated in the act of accommodation.

To obtain *continued*, clear vision an eye must *focus* on the object accurately so as to give a clean cut retinal image at all times and at all distances. Not only that, but to gain perspective, enhancing definition and location in space, the two eyes must be brought into focus at the same time, to the same degree of position and level, so as to have the object simultaneously focused on each macula.

An ametropia (hyperopia, astigmatism, anisometropia, and presbyopia) not easily overcome by an effort of accommodation causes first an interference with clear vision. If the effort is persisted in, a ciliary muscle cramp may develop, as from continued reading or near work by a hyperopic or an astigmatic eye, giving rise to ocular headache. If this near work is carried on during the evening, the symptom may not appear until the next morning.

A hyperopic or farsighted individual with a good reserve of accommodation can see distinctly for distance until this reserve is impaired by local conditions or general health. This reserve is much less for near use and more easily leads to over-exertion and tire, and if efforts to secure clear vision are persisted in, ocular headache ensues.

Ocular headache in young people is more often due to astigmatism than any other cause, up to 75 per cent in the accommodative types of ocular headaches. Varying and unequal contraction of the ciliary muscle (accommodative effort) ends in ciliary muscle fatigue, all in the effort to maintain or gain clear vision, from the confusion of images common to these eyes.

A case in point is headache after near work where no refractive glass is accepted. Use of a cycloplegic and refraction reveal an astigmatism which when corrected relieves the headache. This type of ache shows itself more readily as middle age is reached, as well as in debilitated states.

In hyperopic astigmatism, mixed astigmatism, lastly myopic astigmatism, ocular headache is common, especially where the eyes are used much, but quite unusual in the purely spherical myopia.

All during man's waking hours the unstriped smooth muscle fibers of the ciliary body act with no sensation accompanying the act of accommodation, because of its large reserve power. Over-use of this reserve which physiologically diminishes with age is accompanied by signs of distress—ocular headache.

In presbyopia there is a loss of elasticity of the lens, the range of accommodation or focusing is diminished, and the visual acuity for near work is interfered with. Print has to be held farther away, lighting has to be good, the 3s and 8s, the n's and u's are hard to distinguish. Efforts to read or to do fine work at the usual near point for any length of time are sooner or later attended by headache due to an early fatigue of the ciliary muscle, which relaxes, unable to contract to its full extent. Almost 40 per cent of presbyopes suffer from these focusing headaches. Presbyopia comes about forty-five years of age in the emmetropic, earlier in the hyperopic cases, and later in the myopes. Presbyopia is usually termed a physiological change and yet its early appearance may be the early sign of failing health, as in local or general diseases which affect the neuromuscular system.

The reserve strength of the ciliary muscle is definitely and quickly influenced by the state of one's general health. An emmetropic individual may require a corrective lens to relieve a headache coming on while using the eyes during convalescence from an acute illness, or while suffering from a toxic condition. These lenses are not required when health is regained. Instances of this interference with focusing are seen in adults following an attack of influenza or in children following a siege of measles or scarlet fever. Ordinarily rest restores the function of all over-used muscles; the ciliary muscle, being no exception, may be put at rest with a cycloplegic.

In considering dysfunction of the extra-ocular muscles one has to do with the efforts, neuromuscular, to move and maintain the eyes in the necessary and desirable position for simultaneous, single binocular vision. Here we must consider the muscles moving the eyes and the muscles associated with them as well as their motor nerves, especially the motor nerve cells below the third and fourth ventricles with their elaborate system of inter-communication and co-ordination not only with one another but with the visual nerve centers, auditory and other centers often concerned with ocular movements.

Lancaster emphasizes that it is not merely muscles that are subject to fatigue but that it is also the elaborate intricate system for co-ordination that may be the trouble maker. An exophoria may not be due to a muscular defect but to the management of these muscles by the motor cells or centers. The average healthy individual maintains focusing and the necessary ocular muscle balance for hours at a time. He reads and works at a distance that gives clear vision and keeps up co-ordinate movements of the two eyes, back and forth on a page, focusing and fixing without discomfort, due to a good reserve of muscular power.

The limits of endurance of the focusing and muscular balance mechanisms are reached early and strain follows when one or both have to be content with a handicap, such as in ametropia, which requires not only the additional effort to overcome it but also the usual effort required to focus for the distance of the work. Hence there is the increased effort plus the demands for a more exact and trying adjustment to cause strain. This also occurs when the handicap is poor print, defective lighting, or unsteady objects.

Anything reducing the endurance of the neuromuscular system may end in strain, including general debilitating conditions from diseases of various kinds, overwork, lack of food or sleep, need of outdoor exercise, type of work or lighting and unhygienic surroundings. In a large percentage of cases more than one factor is at work, such as

an error of refraction plus overwork, etc. The proper treatment is the stopping or reducing of the amount of work (or that particular type of work), the building up of general health, the proper refractive correction, or even operation to correct a muscular imbalance.

In considering disturbances of retinal function and congestive states in or about the eyeball, one must remember that a normal eye from early youth and on up to forty years of age adapts itself rather readily to different intensities of light and yet after long usage without periods of rest, under deficient or too high intensities of light (glare) even when accustomed or adapted to them, sooner or later develops fatigue and ocular headache. Under a uniform, steady, average intensity of illumination, such as daylight with natural resting periods, the normal eye is seemingly capable of carrying on indefinitely. After forty years of age—due to neuromuscular, medial, and retinal tissue changes—this adaptation and ease of eye use under variations in illumination become increasingly less.

The congested sick eye suffering an inflammatory disease (such as conjunctivitis, keratitis, iritis, scleritis, glaucoma, retinitis) in the early stages of, during the course of and convalescence from this disease resents light and all efforts of the eye to be used, early ocular fatigue and headache resulting.

A similar hypersensitive condition arises in eyes defective from refractive errors, especially myopic eyes where efforts to see clearly have resulted in retinal hyperemia. Toxic conditions occurring in nephritis, diabetes, alcoholics, intestinal disturbances render an eye less able to carry on its normal visual functions without distress, and doubly so if a refractive error or muscular imbalance already is present.

In the various headaches not found to be due to ocular inflammation or defects one finds in a fair percentage of cases signs in and about the eye which may aid in the proper placing of the causative factor: the ocular-muscle paralyses; the visual and visual-field defects; optic atrophy

or optic papilledema or neuritis, or neuro-retinitis arising from intracranial accidents, inflammation or growths; adjacent sinus disease; or the results of general toxic or infective states; poisoning by alcohol and tobacco, drugs; cerebrospinal lues; diabetes; etc.

In conclusion we find that:

No single theory settles the point as to why certain ocular conditions cause pain or headache in the various regions of the head where it is said to be felt.

Inasmuch as other cranial disturbances may cause pain in similar areas of the head, location of the headache is of relatively little assistance in diagnosis.

Ocular headache may occur in the presence of excellent vision and when the refractive error is of comparatively insignificant amount, due to unconscious efforts of the patient to overcome this error and to his hypersensitive nervous system.

The incidence of headache due to disturbed ocular functions being high renders it advisable to thoroughly examine the eye and its adnexa as a possible cause, even to applying the therapeutic test of a lens correction.

In headache there is almost always more than one causative factor present. Eyestrain may be the easiest of these to remedy, and that may be sufficient because the other factors—such as illness, fatigue, age, and overwork—alone may be insufficient to produce headache. Yet it may be necessary to treat all these factors.

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HEADACHE FROM TOBACCO, DRUGS, ETC.*

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For the many years that tobacco has been used, since its active alkaloid nicotine was recognized as a deadly poison, it was taken for granted that any disturbance in a smoker, which seemed to be possible to trace to the effect of tobacco itself, must be due to the effect of nicotine.

All the writings in our text books, and all the tobacco literature of the past have been based upon that assumption. In recent years evidence has been accumulating which finally seems convincing, that as far as smoking the tobacco is concerned, the deleterious effect on the human organism is more due to some element in the tobacco, other than nicotine, than to the nicotine itself.

There is no question that the blood pressure rises during smoking, and in animal experimentation, small amounts of nicotine cause a rise in the blood pressure, and the coronary, pulmonary, and hepatic vessels are constricted thereby.

The work of Sulzberger and Harkavy, and others, has produced very strong evidence that the clinical effects of tobacco are due to hypersensitization by some substance in the tobacco itself, more than in the smoke, and it seems equally true from their work, that it is not the nicotine which produces all the injurious effects produced by tobacco.

Like all allergins, this unknown substance is inert to normal people, but to any hypersensitized person it may be exceedingly injurious, and the injury seems to be in quantitative relation to the sensitiveness of the individual. Many people smoke practically all their lives with no apparent injurious effects; others find themselves sensitive,

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and have to cease the use of tobacco; others go on, as in the cases of thrombo-angiitis obliterans, in which there is very definite evidence, from the work of these investigators, that it is due to the tobacco, and find themselves crippled for life as a result of the use of tobacco, and their personal sensitization. There seems to be no question that in many examples of allergy, of which tobacco is merely one, the substance taken into the body, by whatever channel, whether it is absorbed by solution of the alkaline saliva from the tobacco in the mouth in cigars and cigarettes, whether it will be found to be due to some substance in the smoke, or in whatever manner it may be introduced, it can go into the circulation, but it has a very strong predilection for some one element in the bodily structure. This point of predilection in tobacco is the vascular system, and both changes in the vessels themselves are present as well as the production of changes in the surrounding tissues from the resulting irregular circulation, and irregularity of blood supply. It is undoubtedly true that the circulating allergin can cause repeated reactions in small circumscribed areas of blood vessels, and these may be found to be in any area in the body.

This is not the place to discuss the various effects of tobacco on the circulatory system, or to discuss its effects in angina, or in thrombo-angiitis obliterans, and other arterial diseases, but it is here a question of the possibility of headache produced by tobacco, and from whence this pain comes.

Compared with the vast number of tobacco smokers that one meets, headache from tobacco is not a wide spread affliction, and tobacco sensitiveness in people in general seems to be somewhere between 20 per cent and 10 per cent, judging from the limited figures so far acquired.

Headache in general has seemed to me to be due to a contraction of the blood vessels in the skin, and a localized contraction, in which the uncontracted arterioles supplying the smaller vessels endeavor to drive a mass of blood through the contracted smaller tubes, causing pain by

pressure on the nerves through this action; or else, if we accept the idea of the allergic action as seen in the urticarial type of allergy, it is due to a pressure of the circulation where there is an actual exudation in the tissues, which produces pressure on the nerves.

There is no question but that smoking raises blood pressure, that is a clinical observation of many years standing long before allergy was conceived to be the basic cause of tobacco poisoning. This rise of blood pressure is produced by stimulation of the sympathetic side of the autonomic nervous system, causing the vasomotor contraction which these nerves control. It has already been demonstrated by Heymans, Bouckert and Regniers that the blood pressure is chiefly controlled by the nervous mechanism of the carotid sinus at the dilation of the internal carotid, where the common carotid separates into the internal and external vessels, and at this junction there is a small so-called gland, or glomerulus, which is not a secretory gland, but is a vascular organ abundantly supplied with nerves from the sympathetic and vagus systems, especially by branches of the glossopharyngeal nerve. Minute amounts of substances passing through the glomerulus, such as very small amounts of nicotine, so small that they are inert if injected into the blood stream, above the gland, will cause a very marked reaction in the rise of blood pressure. It may be this factor which influences the clinical rise of the blood pressure more than even the excessive sensitization which the unknown substance in the tobacco itself produces. The rise of blood pressure is universal in smokers, and I have seen men with normally markedly low blood pressure, have during the years of their smoking, abnormally high pressures, which again fell to the previous hypotension after the cessation of their tobacco, and remained as before at normal hypotension.

Whatever substance may cause the allergic condition, whatever substance it may be that produces the increased vascular tension, it is a repeated dosage many times a day which finally brings about the changes producing the headache, or producing whatever other symptoms there may be.

The chronic action of tobacco on arterioles may change the vessel wall itself, and headache not occur until this change is established, or the headache may come from the acute local spasm of the vessels, and act as an acute poisoning, occurring only with excess of smoking, or become a chronic headache after many years, and be intensely severe. The headache may only accompany an amount of smoking excessive for that individual. Functional changes produced by tobacco have the same characteristics that other allergic manifestations possess; if the offending poison is withdrawn from the body, the symptoms cease, if then resumed, they again reappear.

How frequently tobacco headaches occur it is impossible to say; excessive smoking will produce them in most people; a person smoking too much at night will wake up with a headache in the morning. Caffein in a good strong dose will dilate the vessels, and the morning cup of coffee will relieve the headache, and usually, enough coffee will be taken to see that it does.

Many headaches which are laid to smoking are unquestionably due to other substances, they may be due to other solids or fluids taken the night before, and are blamed on the tobacco. But headache from tobacco does occur, and is dependent for its occurrence on the quantity taken, and on the sensitiveness of the person indulging in it. We cannot gauge these two factors, we cannot say how frequent it is. It is quickly evident in some, it is never evident at all in others. It may be produced by the nicotine, it may have nothing to do with the nicotine, we do not know; it may be produced by an unknown substance in the tobacco absorbed by the alkaline saliva from the moistened tobacco in the mouth; it may possibly be in the tobacco smoke, but to-day this seems doubtful.

The degree of the tobacco headache rests with the individual, and his idiosyncrasy towards sensitization from the use of the tobacco. Furthermore an individual may be sensitive to only one kind of tobacco, not to other kinds.

The relief and cure of this form of headache rests also with the individual. He may smoke and suffer from it, or leave tobacco alone, and be free, or he may smoke from boyhood till doddering old age, and never have a headache from his smoking.

Headaches from other substances used in daily life as food or drink are not uncommon. Coffee and tea cause headaches in some persons, in others not. Caffein in small doses below 20 mgm. per kilo body weight raises blood pressure, but double this dosage and the vessels are dilated.

Most drugs in use to-day do not give headaches, except the group of hypnotics which are so excessively used leave the benumbed and poisoned cerebral tissues still affected after sleep has ceased, and the hypnotic must be followed by an analgesic to obtain relief. The hypnotic habit like other drug habits, expresses the desire for freedom from the worried wear and tear of life, and does not enter into discussion here.

Sugar gives headaches in some individuals if amounts excessive for that organism are ingested. Other foods, as milk or eggs, and many other substances used as food, produce headaches in individuals hypersensitive to them. The mechanism seems to be the same disturbance of the normal balance between the sympathetic and parasympathetic portions of the autonomic nervous system. The idiosyncrasies of this class of substances is best brought out in the widely increasing literature of Allergy, and is too broad a subject for discussion at this time.



ETIOLOGICAL CONSIDERATIONS OF HEADACHE *

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We have been in doubt about the causes and explanation of headache for a long time. All reliable omens indicate that there is a good bit of doubting still to be done. This admission may seem unfortunate in such an advanced day of scientific revelation. It does, perhaps, carry some degree of reassurance in that doubt is usually the beginning, not the end of wisdom; also because science, quite naturally, solves the easier problems first and leaves the hard, knotty ones like headache for days of fuller maturity.

One pointed question probably goes to the core of the matter. What is the nature of pain? This is an old question but its challenge is as young and fresh as it ever was. The final answer seems a good way off. In recent years some helpful light has been shed on the mechanisms of pain. But this illumination does not bring complete conviction that the structural mechanisms of all kinds of pain, including headache, are the same.

It seems fairly well established that each avenue of sense is accompanied by a parallel sidepath for the conduction of pain, discomfort, or distress. This sidepath is not in constant use during ordinarily comfortable life. On the other hand, it is in constant readiness to spread signals of alarm when a tissue, a part or an organ is threatened by excessive stimuli. The sensory avenue of touch beginning, let us say in the finger, if stimulated by .5 milliamperes of galvanic current gives rise to a sensation of tingling. When the current is increased to 1.5 milliamperes a burning, cutting pain is produced. In his recent important investigations of olfactory sense, Dr. Elsberg has shown that a burning, stinging or distressing sensation in the nose is

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associated with odorous substances. Excessive degrees of light or sound cause pain or discomfort along the pathways of sight and hearing. Extremes of heat or cold are also painful. What is true of these types of sense, is equally true of all other types including visceral sensations derived from the blood vessels, heart and lungs, from stomach, intestines and adnexal organs and from the genito-urinary tract.

It seems obvious that this sensory sidepath for pain fills an important biological office. It provides an emergency apparatus for protection against harmful stimuli. Because of its definite biological importance, this emergency pathway requires a discrete structural set-up concerning which a good deal is already known. This structural set-up is typical of all sensory pathways. It consists of a receiving apparatus in the peripheral parts of the body with conducting systems in the peripheral nerves and transmitting mechanisms through the neuraxis into the optic thalamus. Thence it passes upward to discriminating areas in the cerebral cortex where the exact location of the pain is identified, its character is recognized and the proper reaction to it is provoked.

In general, the neurones for the conduction of pain belong to the small and medium sized fiber systems of the cerebro-spinal nerves, sympathetic system and neuraxis. It is probable that some, at least, of the larger sized nerve fibers conduct pain impulses. Many fine fibers make their way in or along the walls of blood vessels, some of which serve to convey impulses of pain. The existence of these pain fibers is now as well established as the neuraxones of similar character in the walls and substance of the viscera.

Thus the perception of pain arising from most parts of the body, depends upon a unitary conduction system. This system is susceptible of irritation at numerous points along the pain pathway. The irritable points best known and most common in experience are the sensory end organs in and about the surfaces of the body. Irritants affecting the peripheral nerves, both somatic and visceral, as well as the

nerve roots and ganglia are capable of producing intense pain such as occurs in certain types of neuritis and in herpes zoster. Irritants involving these more outlying parts of the pain pathway are said to produce peripheral pain. Central pain, on the other hand, occurs when certain parts of the central nervous system are the sites of abnormal conditions. Some lesions in the spinal cord and more notably in the optic thalamus are accompanied by pain or extreme degrees of distress.

The irritants active in the production of pain fall into two large groups, *i.e.*, mechanical and chemical factors. The mechanical factors, in the main, include puncture, laceration, pressure, constriction, compression and distension. The chemical factors embrace a wide variety of intrinsic and extrinsic substances. In the final analysis the mechanical irritants may prove to be reducible to a chemical basis.

Out of these considerations an important leading question arises. Do pains in the head, including headache, depend upon the same unitary neural organization as is operative elsewhere in the body and called into play by the similar mechanical and chemical factors? In part the answer to this question is strongly in the affirmative. It is in the affirmative with reference to the dura mater. All of the parts of the head such as the cranial and facial bones, the scalp and skin of the face, the oral and nasal cavities with the accessory sinuses are equipped with a typical pain pathway. The brain, however, offers a different proposition. Its tissue has been looked upon as insensitive to ordinarily painful irritants and this insensitiveness has long been attributed to the absence of the pathways essential to the typical pain mechanisms. Admitting its other well known idiosyncrasies, the brain in this light is a structural oddity. Being the exponent of all human suffering, it stands immune to the direct sting of pain. Such was the belief until modern investigations gradually modified this view.

Gulland (1898), Huber (1899), Stöhr (1930), Hassin (1930) and Penfield (1931) all described nerve fibers in

the blood vessels of the pia mater. This proof brought the possibility of nerve fibers for pain one step nearer to the brain itself. Huber distinguished two types of fibers; first, medullated fibers which end in non-medullated branches which he considered sensory and second, non-medullated nerves which he considered vasmotor. Stöhr found a rich plexus of nerves in the arteries, veins and capillaries of the pia mater and also in the chorioid plexuses. The existence of nerve fibers derived from the sympathetic system in the blood vessels which traverse the brain was first demonstrated by Penfield (1932). In the past few months Deery (1935) has given further convincing proof of nerve fibers in the walls of blood vessels which pass through the substance of the brain. In addition to these fibers he has also observed long and apparently medullated elements passing from the ependymal cells which line the ventricles. There is still much dispute concerning the nature of these nerve-like structures connected with the lining of the ventricles. I am strongly inclined to believe, however, that they represent medullated nerve fibers probably sensory in character. According to these newer disclosures it seems almost certain that sensory fibers make their way through the brain in the walls of the blood vessels. The existence of sensory fibers connected with the lining of the ventricles, although it must still be held subject to many reservations, has suggestive significance. With these facts in mind it is no longer necessary to regard headache arising from causes within the brain substance as due exclusively to irritation of sensory nerve fibers in the dura mater or pia mater.

Dr. Elsberg (1935) in studying the etiology of headache injected air into the ventricles. Using the encephalographic technique he found that headache occurred most often at the time when the air entered the third and lateral ventricles. This fact indicates that there is a probable connection between such headache and the presence of air in these ventricles. Differences in the location of the headache were observed when the head was placed in different positions.

If, for the moment, a unitary structural organization is accepted as essential for the reception, transmission and perception of all pain impulses, it is possible to survey the etiology of headache in certain comprehensive groups such as headaches due: 1, To causes affecting the head directly; 2, To causes arising in or primarily affecting parts of the body other than the head; 3, To causes incident to lumbar puncture and injection of air; 4, To causes called psychogenic.

It is probable that expanding lesions in the brain are, from many points of view, most important among the causes affecting the head directly. Intracerebral lesions of this kind include brain tumors, abscesses and cysts. The headaches produced by them stand out conspicuously in the long list of human pains. Often they are accompanied by other disturbances such as nausea and vomiting, progressive loss of sight, deprecations in motor and sensory functions, changes in personality, and impairment of reason and consciousness.

Because they are due to foreign bodies growing in definite regions of the brain such headaches tend to become localized and sometimes have areas of local tenderness connected with them on the surface of the skull. Frequently the headache of brain tumor has a location corresponding to the location of the new growth. The pain may be on one side of the head, in the frontal, in the parietal or in the occipital region. In tumors of the posterior fossa the pain often extends from the occiput into the cervical region. Headaches due to brain tumors are usually not continuous in their duration. They are characterized by a certain degree of periodicity. Remissions of considerable length are not infrequent. The headache tends to come on in the early part of the day and diminishes in severity toward evening. Several days or irregular intervals of time may elapse between the severer attacks. These intervals may be entirely free of pain. The patient is then encouraged to believe that he is improving, only to be undeceived by a recurring headache of even greater

intensity. Physical exertion or nervous strain is likely to bring on the pain or increase its severity. These are the classical conceptions concerning the pain caused by brain tumors. All of the accepted traditions and teachings about this kind of pain have been contradicted time and again in actual experience.

Brain tumor headaches are subject to so many and such confusing variations that no hard and fast rules can be laid down for their identification. They may be entirely absent even in patients suffering from large growths which compromise extensive areas of the brain. The pain may be so diffuse as to have no localizing or diagnostic significance whatsoever. It may be continuous and thus without remissions or periodicity. Often it is shifting in its location, now in one place, now in another or occurring in regions of the head diametrically opposite the site of the lesion.

The idea that the headache of brain tumor has a definite and fixed character as to location, time of occurrence, intensity, duration and accompanying symptoms is a thoroughly misleading belief. If huge tumors often exist without producing headaches, so relatively small ones may cause the most severe pain. This and similar contradictory features are difficult to explain. Many differing factors inherent in the nature of brain tumors must be considered before any attempt at explanation can reasonably be made. Among these factors are the general location of the tumor, its relations to the ventricular system and to the meninges, its histological character, its rate of growth as well as the tissue reactions in and around it. Tumors which by their proximity to the ventricular system block the flow of the cerebro-spinal fluid readily cause a distension of the brain by overfilling of the ventricles. Neoplasms which actually invade the brain tissue usually expand more rapidly than those derived from the dura. These latter grow insidiously. They slowly compress the brain and frequently attain a great size before their presence is detectable. Reactions about a tumor such as edema, vascular congestion and proliferation or extravasation ac-

count for the differing conditions which surround the growing mass. Variations in these factors suffice to explain the difference of tension to which the brain is subjected from time to time.

From the facts known at present, it seems probable that a competent sensory mechanism for the conduction of pain impulses exists in the coverings of the brain, within the brain tissue itself and it may be, in the lining of the ventricles. The headache caused by cerebral compression or distension as the result of brain tumor may thus be interpreted in terms consonant with pain perception arising from other parts of the body.

Brain abscess is somewhat more consistent than brain tumor in its tendency to produce headache. On the other hand, small abscesses and even abscesses of comparatively large size in a quiescent stage often fail to cause pain. Furthermore the headache of brain abscess, although generally more significant than that due to brain tumor in localization of the lesion, may be entirely misleading in this respect. The pain caused by abscess in the brain is generally regarded as more severe than that of cerebral neoplasms but fluctuations in duration and intensity are common to both lesions. Here again it is not merely the presence of the abscess in the brain which causes the pain but quite as much the coexistence of various other tissue conditions associated with the lesion. Variations in intracerebral tension as the result of changes in the hemal and lymphatic channels occasion congestion, extravasation and edema of differing degrees at different times. Similarly changes within the abscess causing expansion offer another group of variable factors. In other words, the sum total of the biological factors of a brain tumor or abscess are not constant but, as in any other living structure, are continuously changing. These changes are determined by the nature of the foreign body in the brain whether it be tumor or abscess and by the reactions of the surrounding brain tissue to the foreign body. From this standpoint it is relatively simple to interpret the fluctuating character and duration of the headache.

Cysts of the brain whether parasitic or occlusive, possess the same tendency to expand as do brain tumors and brain abscesses. They are especially prone to cause headache when so situated as to block or impede the flow of fluid in the ventricular system.

Other pathological changes in the brain accompanied by headache are: Hemorrhage into the ventricles or into the choroidal plexuses: Traumatic or spontaneous subarachnoid hemorrhage: Hemorrhage into the substance of the brain which determines the apoplectic seizure. In such cases headache usually precedes the stroke and ceases with the suspension of consciousness. If the patient survives and regains consciousness, headache of some degree of intensity may persist for a relatively long period.

Headache either diffuse or fairly well localized is of common occurrence in all forms of encephalitis. Infiltration of the perivascular lymph spaces is sufficient to occasion widespread changes in the circulatory apparatus of the brain with attendant changes in cerebral tension.

Vascular diseases of the brain, especially those giving rise to aneurysms of the basilar artery or other vessels connected with the circle of Willis are often accompanied by headache. This is also true of advanced cases of arteriosclerosis, more particularly of those instances in which there is a marked degree of lime deposit in the larger vessels.

The headache of cerebral syphilis is most likely chargeable to meningo-vascular type of this infection. Pituitary headache has acquired a well established clinical reputation. Its explanation on the basis of transitory swellings of the pituitary gland seems as improbable as it is fantastic. An endocrine dysfunction of the hypophysis affecting the cerebral circulation recommends itself more strongly as the cause of this kind of headache.

Conditions outside of the brain but confined to the head are frequently the cause of headache. The mechanism underlying such pain is readily understood. A typical

pain pathway is provided in every instance whether it be in the dura, the scalp, the bones of the head and face or the air spaces connected with the nose and ear. The causative factors may be inflammations as in meningitis, sinusitis or mastoiditis, head-injuries or even cranial growths outside of the cranial cavity. In each instance the pain impulses leading to headache are conveyed by a neural apparatus similar to that utilized for pain conduction elsewhere in the body. This explanation seems to be well founded on well established facts.

There are, however, several large groups of headache which leave much room for reasonable doubts as to the neural mechanisms involved. Such doubts apply especially to causes which primarily affect or arise in parts of the body other than the head. Prominent among these conditions are the hypertensive disorders in which the chief morbid changes are in the arteriolar bed. Here the principal exciting factors appear to be fatigue, overexertion, and strain especially of the mental type. The more subtle influences which underlie these headaches are believed to be chemical in nature but their symptomatic effects are looked upon as the result of circulatory changes in the brain. In this sense it is probable that the usual neural mechanism for pain is utilized in the development of hypertensive headaches.

A large range of toxemias has been held responsible for headache. The toxemias associated with febrile conditions are well established in this connection. Equally well known are the toxemias whose activities are not associated with fever. Many toxins of this kind have their origin within the body. The chief source of such trouble is almost universally recognized as the gastro-intestinal tract with the kidney and liver standing well in the forefront. Other toxins, in general less blamelessly acquired, include alcohol, tobacco, morphine, codeine, amyl nitrite, nitroglycerine, lead and carbon-monoxide. It is difficult to draw the line limiting the list of exogenous toxins, for much depends upon conditions connected with ingestion as well as upon the idiosyncrasy of the individual.

The causes of migranous headaches have been the subject of long and earnest discussions. Dr. Riley has recently given the matter thoughtful and scholarly consideration. The nearest approach to conviction about these headaches seems to be that they may be either of endocrine, toxic or allergic origin. Fuller and more satisfying explanations must wait upon further developments in the solution of the headache problem. The allergic possibilities which open up in this connection are especially worthy of notice. They fit in particularly well with the condition described by Dr. Kennedy in which localized edema of the brain in response to special sensitization produces definite cerebral symptoms among them severe headache. This possibility should, in fact, be kept to the fore in seeking the explanation of all headaches presumably of toxic origin.

It is unfortunate that two diagnostic procedures, which ought to be helpful in the problem, have furnished somewhat conflicting evidence. The injection of air into the ventricles for encephalography often produces severe headache. The severity of the pain seems to be in proportion to the amount of air injected. Dr. Elsberg, as already stated, has shown that headache under these circumstances is due directly to the presence of air in the third and lateral ventricles. The location of the pain moreover bears a definite relation to the position of the injected air. Even more familiar is the headache following lumbar puncture. The pain in this case seems to be due to the withdrawal of cerebro-spinal fluid, i.e. a depletion of the ventricular content. It is probable that all of the factors operative after lumbar puncture have not yet been recognized. Ultimately the differences in the two procedures may be brought into harmony and shed more light on the role of the cerebral ventricles in headache.

Still less clear is the explanation of the reflex headaches due to eye-strain. It is almost impossible to attribute their occurrence and localization to the usual neural mechanism for pain. Even more in doubt is the explanation of headaches due to distortion of structural relations in the female pelvis.

Living as we do in what is, perhaps, the most neurotic city in the world—a melting pot of Nordic, Alpine and Oriental races, striving together in avid competition and goaded by the opportunities of a superlative seaport—is there any wonder that so many suffer from headache—is there any wonder that so much of it is put down as psychogenic? The headache called psychogenic has many qualities worthy of consideration. It is thoroughly in sympathy with the rush and hurry of modern life. It is a smooth diagnosis with which to gloss over contemporaneous difficulties. In time, it ripples off the tongue so readily that it requires no cerebral process to guide its use. On nearer view, however, psychogenic, like idiopathic, proves to be a smoke screen cast over our lack of understanding. It is admirably adapted to the needs of the hurried practitioner. It does not, however, look beyond the exigencies of the moment to discover what biological processes may have gone astray or what actual physiological abnormalities may have arisen from the stress of such extremely exacting life. Psychogenic headache as a diagnosis is deserving of a reasonable share of doubt until its clinical entity is more securely established and its mechanism more clearly defined.

Although many types of headache may be explained on a unitary neural basis, other types cannot be interpreted so readily in this way. It seems wisest, therefore, to maintain a conservative attitude in the question of etiology. It may at length be necessary to call upon several widely different interpretations to explain the several clinical varieties of headache.



DRUGS AND OTHER METHODS OF TREATMENT*

FOSTER KENNEDY

New York

The treatment of headache like most things in medicine resolves itself into a problem of diagnosis. In a sense there can be no proper treatment for "headaches" without specific regard for the cause. There are nervous, irritable, highly strung persons whose way of life may be corrected by the imposition of an hour's rest in the afternoon or almost better still by lying down for 15 minutes before and after each meal. This rest period not only should be free of interruption by man, beast or telephones but the patient should know before hand that no intrusion is possible. The world is too much with us, and none of us is enough alone. Further, as duodenal ulcers can follow hard on the heels of emotional stress, so can headache, especially of the constant "steelband" or frontal "helmet" type. It must be the physician's task to try delicately to unravel the skein of circumstances and allow—if the Fates be kind—some gentler pattern to be woven.

At Bellevue Hospital some years ago an investigation was made on persons with skull defects to discover the influence of sleeping, waking, and the administration of drugs on the rise and fall of pressure within the skull. It was found there, first, that the act of falling asleep coincided with an increase of intracranial pressure; the act of waking coincided with a fall. Second, the administration of caffeine by hypodermic produced a marked drop in intracranial pressure, a circumstance which explains the action of caffeine in making sleep difficult. Third, it was found that the opium derivatives greatly increased intracranial pressure and that amyl nitrite increased this pressure more than any other drug—which makes the routine use of such a vasodilator in

* Read before the Stated Meeting of The New York Academy of Medicine, April 4, 1935, as a part of a symposium on headache.

hypertension more hazardous than helpful. Fourth, that intravenous 25 per cent glucose solution by vein changed the osmotic dynamics of the body fluids, dehydrated the brain, and reduced intracranial pressure and the headache that came with and from it.

It would seem that about one-third of all migraine victims have other members of their family similarly afflicted. This corresponds to the inheritability of the allergic constitution. Not nearly enough attention is paid to the problem of allergic headache. Eyerman (*Jour. of Allergy*, vol. ii, No. 2, Jan. '31, p. 106) carefully studying 63 cases of chronic and frequent headache found that in 69 per cent the pain was greatly lessened or failed to appear when certain and specific foods were omitted from the diet and recurred when these foods were eaten deliberately. One of the officers of this Academy suffered most of his life from a not severe, dull headache which appeared daily about 10 A.M., and disappeared before lunch. Not till a prolonged visit to Europe and the substitution of rolls and coffee for his daily egg did he discover tardily the origin of his discomfort. In another place I have arranged what seems to my mind sound evidence for believing that the morbid process in migraine is a localized allergic œdema implicating painfully the meninges and especially their foldings and angled reflexions emanating probably from the brain tissue itself. However, the detail of these happenings would take us too far afield; enough here to speak of one of our Bellevue patients with recurring ophthalmoplegic migraine—the meningeal crevice of the sphenoidal fissure presumably dropsical—recovered from symptoms and maintained good health by an “elimination” diet and had immediate return of pain and local palsies on resumption of the offending protein. (Foster Kennedy, *N. Y. State Journal of Medicine*, November 1st, 1933.) Dr. Mary O’Sullivan working at Bellevue Hospital has found ergotamine tartrate a 90 per cent specific for the migrainous seizure—the cure being often dramatic and ending the attack whether it be ordinarily a 5-day or 1-day episode. This is not achieved by anaesthetizing qualities, for one of our men with severe toothache at

the time of his migraine lost under gynergen (trade name) the latter but not the former, and another of our patients with a gun-shot wound of the brachial plexus causing constant ulnar pain who also suffered from migraine was relieved in his occasional migraine and to his disgust always retained his more embarrassing causalgia. The headaches of constipation are a commonplace to every physician and to multitudinous laymen. The morbid process causing the head pain to come from intestinal stases is less clear—it may well have an allergic basis and we remember that Soma Weiss and Pickering have uniformly produced violent headache by histamine injections.

Sinus headache is commoner in America than Europe; its diagnostic features would take too long to give here—the referred focal occipital pain from a diseased sphenoid should be remembered. I can't help wondering if the English habit of wide open bedroom windows transferred to centrally heated American houses is not responsible for the great incidence of sinus trouble here; our bedrooms are often in winter 30 degrees colder than our day rooms—and our masters, the shirt makers, cut pyjama necks so low that the jugulars and carotids are hard put to it to avoid being pipe-frozen: there would be more sense in leaving off pyjamas and wearing a muffler instead! However, if we should so cater to nudity and the French fear of courant d'air at one and the same time our Anglo-Saxon mores would indeed be in jeopardy! "Eyestrain," I suspect is blamed for more headache than it causes; but Ames of Dartmouth by his iconometer has been helpful in giving information in these matters.

The treatment of headache, as I said at the start, is that of causes: Rheumatic headaches with Heberden-like nodes under the scalp are commoner than is supposed and yield readily to salicylates. I think the most frequent cause of pain in the back of the neck and lower occiput is septic teeth and tonsils. Local skull pain persists sometimes after head injury from the formation of cerebro-meningeal adhesions, and these occasionally are broken up by the technique of

spinal air or oxygen insufflation. I mentioned the referred pain produced by periapical abscessed teeth, but should remind myself also of the grave violent headache often caused by pulpitis—a pain in its severity apparently equal to that of trigeminal neuralgia. Nocturnal syphilitic headache is less common now because of Ehrlich's beneficence, but severe headaches often come from inadequate sleep and undue fatigue. The headaches of the menses and uterine malpositions have only to be referred to. Hypertensive headache may be relieved soon by splanchnic operation—this would seem the right path but we must go down it further for clear knowledge. Head pain due to low barometric pressures is hopeless except for rest, cold baths and aspirin. A word on drugs: acetanilide is a poison and bromoseltzer a menace. Aspirin, phenacetin and caffein citrate are harmless to nearly everyone in ordinary dosage (5 grains of each for one dose—seldom used). Pyramidon can cause agranulocytosis and should be used cautiously. Luminal helps the nervously strained; a simple alkaline effervescent is a good habit—exercise is a better—and perhaps a tranquil mind is the best of all.



LETTERS OF SAMUEL HAHNEMANN

Presented to the Library

REUEL A. BENSON

Two unpublished letters of Samuel Hahnemann, the founder of Homeopathy, have been presented recently to the Academy of Medicine by Mrs. E. K. Dunham, through Dr. Samuel Lambert. These interesting letters were addressed to Hahnemann's pupil and colleague, Dr. Giuseppe Mauro, at that time a practicing physician in Naples, and himself the author of the first book based on Hahnemann's teachings to be written in Italian. Apparently the letters passed from Dr. Mauro to Dr. R. Rubini of Naples, and by him were presented in 1876 to Dr. Carroll Dunham of New York, father of the late Dr. E. K. Dunham. Dr. Carroll Dunham (1828-1877) was a distinguished physician and writer on medical subjects, and a former Dean of the New York Homeopathic Medical College. He travelled extensively in Europe, and organized the first International Homeopathic Congress in 1876. Of Dr. Rubini we know little, but his name will recall to the older generation the "Rubini Camphor pills," which held first place, in the family medicine chests of thirty years ago, as a sovereign remedy for colds.

At the time these letters were written, Hahnemann (Christian Friedrich Samuel Hahnemann, 1755-1843) was living in the German city of Coethen, under the patronage of Ferdinand, Duke of Anhalt-Coethen, who gave him the title of "Hofrath," and made him court physician. For many years, since in 1790 Hahnemann had first voiced what Sir John Weir calls his "glorious discontent" with the therapeutics of his day, he had been hounded from town to town by the apothecaries, who resented his bitter antagonism to polypharmacy and drugging; and had been ridiculed by the conventional practitioners of the period, because of his opposition to blistering and bleeding, the accepted treatment for all diseases. Now, at last, at the age of 75, he

found himself in a friendly community, with financial and intellectual security, his days filled with visits from patients who flocked from all over Europe to consult him. His "Organon" had been translated into five languages; his favorite nephew, Dr. Trinius, was physician to the Russian Czar; his friend, Curie (father of the discoverer of radium), was editing the first Homeopathic Journal in Paris. To the little cottage in Coethen came a constant procession of hungry-minded physicians, hoping to find an escape from their medical discontent. Among others, Dr. Valentine Mott, the celebrated New York surgeon, visited him, and after his return wrote, "Hahnemann is one of the most accomplished and scientific physicians of the present age."

In 1832 Hahnemann was made an honorary member* of the "Medical Society of the City and County of New York," and was presented with a Latin diploma. It is interesting to note that this honor from the medical profession in New York was indirectly responsible for his second marriage. At the age of eighty he married Melanie d'Herville Gohier, a French woman of thirty-five. Albrecht, his German biographer, writing in 1851, says of her, "On a visit to the Paris Bourse one day she learned that Hahnemann had been appointed President of the Medical Faculty of New York. Then she immediately said to herself, 'Where the man lives I must go, I must investigate this.'" She journeyed posthaste to Coethen, became a grateful patient, and ultimately the bride and exploiter of Hahnemann during his senile years.

We have a graphic description of Hahnemann, written by Dr. Griesselich of Karlshruhe, who visited him in Coethen in 1832:

Hahnemann at the age of seventy-seven showed in every action all the fire of a young man. No trace of old age could be detected in his physical appearance, except the white locks surrounding his temples, and the bald crown, which is covered with a velvet cap. Small, and sturdy in form, Hahnemann is lively and brisk; every movement is full of life. His eyes reveal his inquiring spirit; they flash with the fire of youth. His features

* This action was rescinded one week after Hahnemann's death.

are sharp and animated. As old age seems to have left few traces on his body, so it is with his mind. His language is fiery and fluent; often it becomes vehement as a stream of lava against the enemies and opponents, not of himself personally, for that he never alluded to, but of the great truths to the testing of which he had summoned his colleagues for many decades. His memory seems to be unaffected; after long interludes and side conversations, he continues where he left off.

When he becomes heated in conversation, which often happens, whether about friend or foe, or on scientific subjects, his words flow forth uninterrupted, his whole manner becomes extremely animated, and an expression appears on his countenance, which the visitor admires in silence. Perspiration covers his lofty brow; his cap is removed; even his long pipe—his trusty companion—goes out and must be relighted by the taper that is at hand kept burning all day. But the white beer must not be forgotten. The venerable old man had so accustomed himself to this sweet drink that it always stood in a large covered glass on his table; at his meals, too, he takes this drink, which is unknown in South Germany. He does not drink wine; his mode of life is very simple, abstemious and patriarchal.

Like all Hahnemann's letters these two specimens show his characteristic "copper plate" handwriting on rough but well preserved letter paper. They were written with an unsplit quill, and although they are in German, the English script is used instead of the German, probably because they were written to a foreigner. Although Hahnemann was fluent in both French and Italian, he seems always to have preferred to write and converse in his native language, and he urged his followers to do the same. He would no doubt repudiate the following translations.

To Dr. Giuseppe Mauro in Naples

Dear Friend and Colleague:

I have just received from our mutual friend, the distinguished Counsellor von Gersdorff, your charming present, the pictures of exquisite fruit and flowers, and I thank you for the proof of your constant affection and esteem, which I hope I may never lose.

You have imparted to us a splendid account of your treatment of a woman suffering from Hemiplegia, and I send you my hearty approval. You wish some advice from me in regard to her continuing incapacity to speak, and it will give me great pleasure if I can help. It seems far more likely that the defect lies in the memory centres than in the speech organs, because if the latter were at fault, you would have seen an improvement after the use

1829.

Dear Sirs College!

Ihr wünschen Sieß von 5 April hätte ich nicht eher, als jetzt, Gelegenheit zu beantworten. Ich Ihrer Befragung (im Falle sie nach Neapel kommt) die Frau Zürfin von Ingenteim empfahl, die vor 2 Jahren auf Paris zu und mit ihrem Gemahll und Sohne, wo die Arzte gewöhnlicher Art sie fast zu Tode curirt hatten. Um sich vor diesen Alléopathen zu retten, kam sie zu Ende Decemb're 1827 zu mir nach Lötschen in die Lütsch mitten im Hinterland. Eine Art von kramphaftem Schmerze in der Gegend des Brustens um überfiel sie in Anzügen anfänglich in Paris alle 4, 6 Wochen, nach und nach aber bei der zweckwidrigen dörstigen Beständigung in immer kürzerer Zeit und mit größter Heftigkeit, zuletzt alle 8, 10 Tage mit solcher Heftigkeit, daß sie vor Schmerz über laut daei schrie, die Umstehen den nicht kannte, auf keiner Stelle Ruhe hatte weder im liegen, gehn, sitzen noch im stehen. Ihr Gesicht war verzerrt, sie wälzte sich auf dem Fußboden, oder sprang auf und lief und schrie und warf sich wieder ^{nieden} unter öfterem Fabrechen — was die letzte Zeit in Paris und auf der Reise lieber jedesmal 24 Stunden, Tag und Nacht anhielt. An der Stelle war nichts Krankhaftes zu sehen, nur daß sie beim Brühen höchst empfindlich war. In meiner Behandlung mit antipathischen Arzneien hat sie nur einen müßigen Anfall wieder gehabt von selbst und einen zweiten, nachdem sie aus Verschen ein Pulver mit etwas langsam Reagieren, was für den Sohn bestimmt war. Die hat aber ohne eigentliche Anfälle oft einen Schmerz in der Stelle, den sie bald für Dürren, bald für Knochen schmerz ausgibt. Auch klagt sie manchmal über einen Halsschmerz, den sie nicht recht beschreiben kann, und hat oft Schleim (Fingultum). Sie ist eignisinnig und klagt über Kleinigkeiten. Jetzt ist sie schwanger. Wenn Sie über solche Kleinigkeiten consultirt werden sollten, so kann Sie wohl, sie mit einem Extrapolver zu beruhigen, was aus kleinem Milchzucker besteht — denn sie hat von mir noch fortwährend antipathica einzunehmen. Das letzte, was sie etwa Anfang August eingenommen hat, (in Genf), war eine weitere Verdünnung von K. Sulph. (spirit. r. n. sulphat) — auf $\frac{1}{4}$ und 48 Tage drauf will sie in Nr. 9 von 24 Pillenchen (alterndieß) natrumuracitum $\frac{1}{2}$ einnehmen. Dieses neue Antipathicum, das durch normaliges Krystallisiren gereinigte und stark potenzierte Küchensalz ist eins der stärksten antipathischen Mittel und hat ihr vor allem die besten Dienste geleistet.

Von Doctor Stäff können Sie einen weit ähnlichen Eindruck von meinem Zölle sich schicken lassen, als daß von Ihnen beigelegte kleine Bild ist was mir wenig ähnelt — auch eine auf mein Doctor Jubiläum geprägte sehrene Medaille kann er Ihnen schicken. Seien Sie recht wohl und behalten Sie Ihre Coethen den 4 Sept. 1829.

ergebensten Samuel Hahnemann.

LETTER FROM HAHNEMANN DATED 4 SEPT., 1829

(Slightly Reduced)

of Calcarea. As the difficulty evidently lies in the thought and memory processes, I think you will have more success with Lycopodium $\frac{0}{X}$ inhalations every fourteen days (in all only some two or three times), and also Euphrasia $\frac{0}{X}$ and Anacardium given in the same way. At least, this is my hope; and I have already found these remedies of service in similar circumstances. The patient must not fail to go out of doors every day, regardless of weather. She will also profit by having a robust, healthy-minded person lay both hands flat on the crown of her head for one minute every morning (Mesmerism).

And now I wish you the best of health, so that you may continue to gratify your noble zeal in the propagation of our beneficent art in saving the sick.

Your true friend,

Samuel Hahnemann.

Coethen

January 27th, 1833.

Dear Colleague:—

I have not until now had the opportunity of answering your kind letter of April 5th, and of recommending to your care the Countess of Ingenheim, should she come to Naples. Two years ago she fled with her husband and sons from Paris, where the regular Physicians had nearly caused her death in their attempts to cure her. To save herself from these "Allopaths," she came to me for treatment in Coethen in mid-winter at the end of December 1827.

Every four to six weeks she suffered from a kind of cramping pain in the duodenal region, which attacked her in paroxysms. These pains began in Paris, and on account of the antipathetic treatment, came oftener and with greater force, so that she screamed with pain at the top of her voice, failed to recognize her surroundings, and could find no relief, either lying down, walking, sitting or standing. Her face was distorted. She threw herself writhing on the floor, sprang up and ran about screaming, and threw herself down again, often vomiting. Lately, both during her stay in Paris and on her journey here, these attacks persisted for twenty-four hours at a time, through the day and night.

Locally I could find no abnormality except for extreme sensitivity to touch. During my treatment with antipsoric remedies, she had only one spontaneous attack, which proved to be slight, and a second caused through her own carelessness in taking a powder containing Camphor, intended for her son. Very often, however, without any real attack, she has local discomfort, which she describes as sometimes pressure and sometimes soreness. She also complains of sore throat, which she cannot clearly describe, and often suffers from hiccough (singultum). She is obstinate, and fusses about details. At present she is pregnant.

Should you be consulted in regard to these minor symptoms, it would be advisable to quiet her with placebo consisting only of milk sugar, as she must continue the antipsoric remedies that I have prescribed for her. The last powder, which she took about the beginning of August in Geneva, was a higher attenuation of Tr. Sulphur (spirit vini sulphur) namely $\frac{00}{X}$. Forty-eight days later she will take the twenty-four powders, No. 9 of which contains Natrum Muriaticum $\frac{0}{X}$. This new antipsoricum, common table salt, purified by recrystallization and highly potentized, becomes one of the strongest antipsoric remedies, and has afforded her the greatest benefit.

From Dr. Staph you can obtain a better lithographic print of my picture than the small one enclosed in your letters, which is a very poor likeness. He can also send you a medal, that was made in honor of the anniversary of my Doctor's degree.

God bless you!

May you remember with affection

Your most devoted

Samuel Hahnemann.

Coethen, September 4th, 1829. .

Hahnemann's use of the term "antipsoric" remedies refers to his theory that many chronic diseases are caused by a constitutional "taint," which may be hereditary; and that this is often manifested by various skin eruptions, which he termed "Psora."

The symbols following the drugs refer to his method of dilution ("medicaments au globule"). He was constantly experimenting with dosage and methods of administration; and apparently at this time he was advocating the use of medicines by inhalation. Later he abandoned this method.

The reference to "Mesmerism" is natural. When Mesmer first propounded his theories in Vienna in 1777, Hahnemann was a protege of, and assistant to, Von Quarin, Physician to Maria Theresa and the Emperor Joseph; Hahnemann must have known at first hand of Mesmer and his strange new theories. That he was impressed with them is evident from the advice given in this, as well as in other letters.

It is hard for the present generation to realize the bitterness and hatred that Hahnemann's teachings aroused in Europe and America. To one who studies his life it is clear that he is intolerant and bigoted, but equally clear that he was a great rebel and reformer. In medical history he is an outstanding personality during a period when there were few figures of importance.

THE EARLIEST MODERN LAW FOR THE REGULATION OF THE PRACTICE OF MEDICINE

JAMES J. WALSH

* New York

In an editorial published some thirty years ago *The Journal of the American Medical Association* called attention to the first law for the regulation of the practice of medicine of which we have any definite record in modern history. It contains so many clauses that were meant to correct abuses, with which the medical profession is concerned at the present moment, so many definite directions as to the relations of physicians to the community, to the authorities and to druggists, which we are prone to think that the medical profession and our legislators have only come properly to consider in recent years, that it has seemed worth while to present it in its entirety. It is to be found in "Studies in the History of Anatomy in the Middle Ages," by Robert Ritter von Töply,¹ which is one of the important contributions in the history of medicine made in recent years. The book is comparatively little known in America and that makes it all the more advisable to present the actual words of the law, for it is represented only in abstracts in the histories of medicine written by Haeser and Puschmann.

According to Haeser, the law was published in 1241, or according to Winkelmann, in 1240. (Von Töply quotes it from Huillard-Brehollis' *Diplomatic History of Fred-*

erick II, with Documents, which consists of twelve quarto volumes. Paris, 1851-1861.) This is one of the wonderful sets of documents that came from Frederick II, surnamed the Hohenstaufen, the German Emperor of the time, whom most historians are agreed in proclaiming the most remarkable historical figure of the Middle Ages. He was the grandson of Frederick II, was elected king of the Romans in 1196, and his father dying the next year he was crowned king of Sicily. At this time the kingdom of Sicily included not only what we now call the island of Sicily, but also the lower part of Italy, which was then called Greater Sicily or the kingdom of Naples. This was all that Frederick inherited, but by his own efforts he succeeded in making himself the Emperor of Germany, or as the office was then called, because the incumbent was at least supposed to be a successor to the power of the Roman emperors, the Holy Roman Emperor. His genius for government will probably be best revealed to physicians at least by this wonderful piece of medical jurisprudence which we quote:

LAW OF FREDERICK II REGULATING MEDICAL PRACTICE

"While we are bent on making regulations for the commonweal of our loyal subjects we keep ever under our observation the health of the individual. In consideration of the serious damage and the irreparable suffering which may occur as a consequence of the inexperience of physicians, we decree that in future no one who claims the title of physician, shall exercise the art of healing or dare to treat the ailing, except such as have before-hand in our University of Salerno passed a public examination under a regular teacher of medicine and been given a certificate, not only by the professor of medicine but also by one of our civil officials, which declares his trustworthiness of character and sufficiency of knowledge. This document must be presented to us, or in our absence from the kingdom, to the person who remains behind in our stead in the kingdom, and must be followed by the obtaining of a license to practice medicine either from us or from our representative aforesaid. Violation of this law is to be punished by con-

fiscation of goods and a year in prison for all those who in future dare to practice medicine without such permission from our authority.

"Since the students can not be expected to learn medical science unless they have previously been grounded in logic, we further decree that no one be permitted to take up the study of medical science without beforehand having devoted at least three full years to the study of logic.² After three years devoted to these studies he (the student) may, if he will, proceed to the study of medicine, provided always that during the prescribed time he devotes himself also to surgery, which is a part of medicine. After this, and not before, will he be given the license to practice, provided he has passed an examination, in legal form, as well as obtained a certificate from his teacher as to his studies in the preceding time. After having spent five years in study he shall not practice medicine until he has during a full year devoted himself to medical practice with advice and under the direction of an experienced physician. In the medical schools the professors shall during these five years devote themselves to the recognized books, both those of Hippocrates as well as those of Galen, and shall teach not only theoretic but also practical medicine.

"We also decree as a measure intended for the furtherance of public health that no surgeon shall be allowed to practice, unless he has a written certificate, which he must present to the professor in the medical faculty, stating that he has spent at least a year at that part of medicine which is necessary as a guide to the practice of surgery, and that, above all, he has learned the anatomy of the human body at the medical school, and is fully equipped in this department of medicine, without which neither operations of any kind can be undertaken with success nor fractures be properly treated.

"In every province of our kingdom which is under our legal authority, we decree that two prudent and trustworthy men whose names must be sent to our court, shall be appointed and bound by formal oath, under whose

inspection electuaries and syrups and other medicines be prepared according to law and only be sold after such inspection. In Salerno in particular we decree that this inspectorship shall be limited to those who have taken their degree as masters in physic.

"We also decree by the present law that no one in the kingdom except in Salerno or in Naples [in which were the two universities of the kingdom.—ED.] shall undertake to give lectures on medicine or surgery, or presume to assume the name of teacher, unless he shall have been very thoroughly examined in the presence of a government official and of a professor in the art of medicine. [No fake medical schools.—ED.]

"Every physician given a license to practice must take an oath that he shall faithfully fulfill all the requirements of the law, and in addition that whenever it comes to his knowledge that any apothecary has for sale drugs that are of less than normal strength, that he shall report him to the court, and besides that he shall give his advice to the poor without asking for any compensation. A physician shall visit his patient at least twice a day and at the wish of his patient once also at night, and shall charge him, in case the visit does not require him to go out of the village or beyond the walls of the city, not more than one-half tarrene in gold for each day's service.³ From a patient whom he visits outside of the village or the wall of the town, he has a right to demand for a day's service not more than three tarrenes, to which may be added, however, his expenses, provided that he does not demand more than four tarrenes altogether.

"He (the regularly licensed physician) must not enter into any business relations with the apothecary nor must he take any of them under his protection nor incur any money obligations in their regard.⁴ Nor must any licensed physician keep an apothecary's shop himself. Apothecaries must conduct their business with a certificate from a physician according to the regulations and on their own credit and responsibility, and they shall not be permitted to sell

their products without having taken an oath that all their drugs have been prepared in the prescribed form, without any fraud. The apothecary may derive the following profits from his sales: Such extracts and simples as he need not keep in stock for more than a year, before they may be employed, may be charged for at the rate of three tarrenes an ounce. [Ninety cents an ounce seems very dear, but this is the maximum.] Other medicines, however, which in consequence of the special conditions required for their preparation or for any other reason, the apothecary has to have in stock for more than a year, he may charge for at the rate of six tarrenes an ounce. Stations for the preparation of medicines may not be located anywhere but only in certain communities in the kingdom as we prescribe below.

"We decree also that the growers of plants meant for medical purpose shall be bound by a solemn oath that they shall prepare their medicines conscientiously according to the rules of their art, and so far as it is humanly possible that they shall prepare them in the presence of the inspectors. Violations of this law shall be punished by the confiscation of their movable goods. If the inspectors, however, to whose fidelity to duty the keeping of the regulations is committed, should allow any fraud in the matters that are entrusted to them, they shall be condemned to punishment by death." [The first pure drug law.—ED.]

DIPLOMA

The diploma which went with the law and which we would call a license, is very interesting as an anticipation of many modern ideas. It runs as follows:

"We hereby make it known to all our loyal citizens that our loyal citizen, N. M., having presented himself at our court and been properly examined, has been recognized by the court as a loyal citizen and one descended from a worthy race and as properly fitted for the practice of the medical art. Therefore, we convinced of his knowledge and his readiness to obey the laws, after receiving his oath of fidelity to us and his oath to exercise his profession in a true

manner according to the customs of physicians, granted him the license to practice the medical art in every part of our kingdom, on condition that he exercise his art faithfully as becomes our dignity and our fidelity to our subjects, as well as for the good health of those who need his services. Therefore, we bring this matter to the knowledge of our faithful subjects so that no one may disturb this our loyal subject, N. M., aforesaid, in the practice of his art nor in any way hinder him in any part of our domains."

This is so different from what is usually thought to have been the condition of medical practice and so striking an anticipation of everything that is most modern in the regulation of medicine that one almost hesitates to accept it as authentic. A word as to its authoritativeness and as to the channel through which it comes may not be out of place. There is no doubt that it is an original document of the time of Frederick II. It occurs in connection with other documents of undoubted origin and date. As already stated, the present version comes to us through the German of Robert Ritter von Töply, who is considered probably the best living authority in Germany on the history of medicine, and especially anatomy in the Middle Ages. He was selected by the editors of Puschmann's "Handbook of the History of Medicine," the most recent authoritative work on the subject, to write the chapters on the history of anatomy in the Middle Ages.

1. *Studien Zur Geschichte der Anatomie im Mittelalter*, Robert Ritter von Töply, Leipzig und Wien, Franz Deuticke, 1898.
2. Under logic at this time was included the study of practically all the subjects that are now taken up in the arts department of our universities. Huxley, in his address before the University of Aberdeen, on the occasion of his inauguration as rector of that university said: "The scholars (of the early days of the universities, first half of the thirteenth century) studied grammar, rhetoric, arithmetic and geometry, astronomy, theology and music." He added: "Thus their work, however imperfect and faulty judged by modern lights, it may have been, brought them face to face with all the leading aspects of the many-sided mind of man. For these studies did really contain, at any rate in embryo—sometimes, it may be, in caricature—what we now call philosophy, mathematical and physical science, and art. And I doubt if the curriculum of any modern university

shows so clear and generous a comprehension of what is meant by culture as the old trivium and quadrivium does." Science and Education Essays, page 197; New York, D. Appleton & Co. 1896.

3. A tarrenus or tarrene in gold was equal to about thirty cents of our money. Money at that time had from ten to fifteen times the purchasing power that it has at the present time. An ordinary workman at this time in England received about four pence a day, which was just the price of a pair of shoes, while a fat goose could be bought for two and a half pence, a sheep for one shilling two pence, a fat hog for three shillings, and a stall-fed ox for 16 shillings (Act of Edward III fixing prices).
4. Apparently many different ways of getting round this regulation had already been invented and the idea of these expressions seems to be to make it very clear in the law that any such business relationship no matter what the excuse or the method of it, is forbidden.—ED.

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February 1, 1908, Vol. I, pp. 388, 389.

CORRECTION

Continuation of Discussion of Dr. Goodman's Paper on
"A SKIN TEST TO SUGGEST THE DIAGNOSIS OF
RECOVERED TYPHUS AND THROMBO-ANGIITIS,"

Published in the

JUNE BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE
*(Due to stenographic errors in reporting, this discussion
is printed in corrected form.)*

DR. JOSEPH HARKAVY: The observations of Dr. Goodman are certainly interesting. If I understand him correctly he reports that he has obtained positive skin reactions with a formalinized Rickettsia suspension in a series of cases who had typhus fever and negative reactions in normal controls, who gave no history of typhus. Similar positive skin reactions to the Rickettsia suspension were found by him in a group of patients suffering from thrombo-angiitis obliterans. On the basis of this association Dr. Goodman reasons that these patients must have had typhus

in some form and hence he claims there is the possibility that thrombo-angiitis obliterans is related to typhus fever infection.

It seems to me that while Dr. Goodman's findings might tempt him to reach the above conclusions, detailed analysis of the facts scarcely warrants such an assumption.

To begin with it is well known that occlusive vascular involvement may occur in many infectious diseases. In typhoid fever, thrombo-phlebitis with ulceration of the involved extremity and arteritis followed by gangrene, have often been reported. Incrimination of the typhoid bacilli as a cause of the thrombosis because of recovery of these organisms from the affected blood vessels has been open to the objection that the bacilli may merely have been present in the blood stream and were incorporated in the thrombi.

In typhus fever the vessels of the brain, skin, skeletal muscles and some viscera are notoriously involved. Wollbach states that typhus is a disease of the smaller vessels. The presence of Rickettsia bodies in such vessels is probably likewise evidence of a general blood stream invasion.

The finding of positive skin reactions to the Rickettsia bodies in individuals who have had typhus fever is not surprising for skin sensitization to the organism responsible for a generalized infection, may frequently follow.

It so happens that many of our cases of thrombo-angiitis obliterans in New York come from Eastern Europe where typhus is prevalent. Some of these may have had typhus and hence developed skin sensitiveness to the Rickettsia bodies. We have, however, also seen numerous patients with thrombo-angiitis obliterans from other parts of the world, who never have had typhus and many who with the exception of childhood infections were completely well until the onset of their vascular impairment.

Skin tests alone cannot settle this question. On the basis of the fact that a general bacterial infection can be followed by a skin sensitization to the invading micro-organism, I should expect a patient with thrombo-angiitis obliterans to

react to streptococcus filtrate or streptococcus nucleoprotein, if he has had a streptococcus infection, or, for that matter, to any other micro-organisms with which his blood stream may have been invaded.

Everybody knows that a positive Widal may be found 20 years or longer after a typhoid infection, and it may also persist for a long time in those who only received typhoid vaccine prophylactically. Yet I am certain that in the presence of a positive Widal or positive skin reaction to a streptococcus filtrate in a patient with thrombo-angiitis obliterans, Dr. Goodman would not be willing to assume that the thrombo-angiitis obliterans was due to some streptococcus infection, to typhoid, or any other bacteria.

Skin reactions to Rickettsia bodies are subject to the same limitations as any other skin reactions. Before one can say that an antigen which induces a positive skin reaction is etiologically significant one must be able to reproduce symptoms of the disease in question by introducing the antigen into the body, or cause a cessation of symptoms by the withdrawal of this agent. We know that cessation in the use of tobacco brings thrombo-angiitis obliterans under control. This is the experience of Dr. Silbert in over a thousand cases, as well as of other workers in this field. Thrombo-angiitis obliterans may be completely arrested in the early stages on withdrawal of tobacco.

There is one possible theoretical explanation of the role of typhus fever or any other general infectious disease occurring in individuals with constitutionally vulnerable vascular systems (i.e. allergic individuals), and that is, that the toxins of the invading micro-organisms may sensitize that kind of vascular system so that it becomes a shock organ, if it is not already such by virtue of inheritance. Subsequent repeated contact with unrelated antigens, like tobacco for instance, may cause an inflammatory reaction in such sensitized blood vessels which may result in more or less permanent damage. This would in a sense be comparable to the Shwartzman phenomenon.

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DEATHS OF FELLOWS OF THE ACADEMY

ASCH, JOSEPH JEFFERSON, M.D., 111 East 80 Street, New York City; graduated in medicine from the College of Physicians and Surgeons, New York City, in 1902; elected a Fellow of the Academy March 6, 1913; died August 15, 1935. Dr. Asch was a member of the American Medical Association, of the American Urological Society, of the American Psychoanalytic Society, of the International Psychoanalytic Society, of the New York Urological Society, of the New York Psychoanalytic Society, and of the Alumni Society of the Lenox Hill Hospital. He was Cystoscopist to the Lenox Hill Hospital and Consulting Surgeon to the Lenox Hill Hospital Dispensary.

EISBERG, HARRY BELLEVILLE, M.D., 161 East 19 Street, New York City; graduated in medicine from University and Bellevue Hospital Medical College in 1913; elected a Fellow of the Academy January 3, 1924; died August 10, 1935. Dr. Eisberg was a member of the County and State Medical Societies, a Fellow of the American Medical Association, a Fellow of the American College of Surgeons, a member of the American Society for the Advancement of Science, and a member of the American Society for

Regional Anesthesia. He was Surgeon to Harlem, Riverside and Lutheran Hospitals, and Consulting Surgeon to the United States Marine, Ellis Island and North Hudson (Weehawken) Hospitals.

HENSEL, OTTO, PH.G., M.D., 935 Park Avenue, New York City; graduated in medicine from the College of Physicians and Surgeons in 1900; elected a Fellow of the Academy December 3, 1908; died July 13, 1935. Dr. Hensel was a member of the County and State Medical Societies and a Fellow of the American Medical Association. He was physician to Lenox Hill Hospital.

KIRBY, GEORGE HUGHES, M.D., 1010 Fifth Avenue, New York City; graduated in medicine from the Long Island College Hospital Medical College in 1899; elected a Fellow of the Academy May 2, 1918; died August 11, 1935. Dr. Kirby was a member of the American Psychiatric Society, of the American Neurologic Society, of the Society for Clinical Psychiatry, and past president of the Psychiatric Society and of the Neurological Society. He was Consulting Psychiatrist to the Presbyterian Hospital and the Psychiatric Institute, and Psychiatrist to the New York Hospital. Dr. Kirby was for some time Professor of Psychiatry in Cornell Medical College and in the College of Physicians and Surgeons. In 1917 he became Director of the New York State Psychiatric Institute and planned and carried to completion the new Institute as a unit of the Columbia-Presbyterian Medical Center. He was the author of many articles on psychiatric subjects.

MILLER, GEORGE NORTON, B.A., M.D., 943 Lexington Avenue, New York City; graduated in medicine from Harvard University Medical School in 1882; elected a Fellow of the Academy December 15, 1904; died July 30, 1935.

RICE, CLARENCE CHARLES, M.D., 52 Park Avenue; graduated in medicine from the College of Physicians and Surgeons in 1877; elected a Fellow of the Academy April 7, 1887; died July 5, 1935. Dr. Rice was a member of the County and State Medical Societies, the American Laryngological Society and the Pathological Society. At the time of his death Dr. Rice was Emeritus Professor of Laryngology at Post-Graduate Hospital.

SILVER, LEWIS MANN, B.A., M.D., 101 West 72 Street, New York City; graduated from Yale University in 1882 (B.A.); graduated in medicine from Bellevue Hospital Medical College in 1885; elected a Fellow of the Academy April 6, 1893; died August 14, 1935. Dr. Silver was a member of the State and County Medical Societies, a Fellow of the American Medical Association, a Fellow of the American College of Physicians and a member of the Society of Alumni of Bellevue Hospital Medical College.

WELKER, FRANKLIN, M.D., 638 West 174 Street, New York City; graduated in medicine from the University of Pennsylvania in 1894; elected a Fellow of the Academy January 7, 1909; died July 17, 1935. Dr. Welker was a member of the County and State Medical Societies, the National Tuberculosis Association, the American Congress of International Medicine, the Kings County Hospital Alumni Club, and a Fellow of the American Medical Association and the American College of Physicians. At the time of his death Dr. Welker was President of the County Medical Society and Medical Director of Lutheran Hospital.

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PUBLIC RESPONSIBILITY FOR PUBLIC AND PERSONAL HEALTH*

The Biggs Health Center Plan of 1920 in Retrospect

THOMAS PARRAN, JR.

Albany, N. Y.

Fifty-three years ago a candidate for the bachelor's degree at Cornell University presented as his graduation thesis the subject "Sanitary Regulations and the Duty of the State in Regard to Public Hygiene." In this thesis the student said;

"This is a period in our national history in which sanitary science is receiving a large and constantly increasing share of public and professional attention. The last half century . . . has been marked by great advances made in this direction; advances which we may reasonably believe are but first indications of the greater developments in the future.

"The enjoyment of health, immunity from suffering, and long life are the greatest temporal blessings that man can desire. . . . There are certain natural and sanitary laws that regulate the functions of life, . . . insure a more uninterrupted enjoyment of health, exemption from many infirmities and a prolonged existence.

"Upon the recognition and careful observation of hygiene laws depend the healthy physical condition and so the prosperity not only of individuals and communities but also of whole states and nations

" . . . There are other considerations far higher than the financial one which render governmental action in regard to the public health imperative. . . . Not only is the physical condition of a public dependent upon their sanitary surroundings but their moral and intellectual condition is also largely determined by those same surroundings."

* Hermann Michael Biggs Memorial Lecture, delivered at The New York Academy of Medicine, May 2, 1935.

In such fashion did Hermann M. Biggs, this student of twenty-three, not yet embarked upon medicine as a career, visualize the problems of his life work. It is to honor his memory that we are here tonight.

Doctor Biggs contributed to so many phases of medicine that a review such as this can deal only fractionally with his accomplishments.

The introduction of diphtheria antitoxin; the use of the laboratory as the spear-head of the public health movement; the first requirement that tuberculosis be reported, and the administrative control of this disease; the campaign for public education concerning tuberculosis later expanded to include all phases of public health; the pioneer effort to reduce infant mortality; the first municipal effort to control the venereal diseases; the inspiration of his teaching and leadership;—each is worthy of discussion in the light of subsequent medical history. This evening, however, I shall discuss more particularly his last great proposal for public health advancement—the New York health center program. Sixteen years have elapsed and the plan has not been realized; nor has any substitute measure been adopted to meet the needs which Biggs even then saw so clearly, and which today occupy a central place in medical discussions.

Through several sessions of the Legislature from 1919 until his death, Biggs fought for an integrated system of preventive and curative medical service in the State. He proposed:

- " 1. To provide for the residents of rural districts, for industrial workers, and all others in need of such service, scientific, medical and surgical treatment, hospital and dispensary facilities, and nursing care at a cost within their means, or, if necessary, free.
- " 2. To assist the local medical practitioner by providing facilities for accurate diagnosis . . . both hospital and out-patient; consultation and advice as to treatment by medical and surgical experts; clinical, pathological and chemical laboratory service and x-ray facilities, at a moderate cost or free when necessary.
- " 3. . . . Facilities for an annual medical examination . . .
- " 4. . . . Adequate school medical inspection and school nursing service.

- " 5. . . Better . . . administration of public health activities . . .
- " 6. A public health nursing service adapted to and adequate for the community served.
- " 7. . . Dissemination of information in regard to public health . . .
- " 8. Adequate compensation for medical and surgical service rendered in hospitals and clinics . . .
- " 9. Laboratories, diagnosticians, consultants and hospital facilities in the smaller cities and rural districts.
- " 10. Medical libraries and health educational material.
- " 11. Hospital and other necessary resources for dealing promptly with epidemics.
- " 12. . . Prompt and accurate diagnosis and surgical treatment for sick and indigent (industrial) workers and members of their families.
- " 13. Coordination of public health activities within the districts."

To accomplish these aims, Biggs proposed that municipalities be authorized to erect health centers, for the construction and maintenance of which state aid would be granted, the grants to be contingent upon satisfactory standards of construction and service.

Stripped of all embellishments, the Biggs' plan contemplated a public medical and health service, to be administered by local health departments under state supervision and aid combined with improved private practice in a logical system for all citizens in need of such service.

Although formally endorsed by the State Medical Society, opposition to the health center plan arose largely from medical sources, preventing its passage. It is said that at his death Biggs considered that his public health career had been a failure since this, the greatest project of his life, was incomplete. The opponents centered their fire upon that section of the plan providing expert consultants who would "teach local practitioners how to practice medicine"; although this phase was relatively unessential to the broader concept. In spite of the failure of the legislation proposed by Biggs, it can not be said that the health center plan was a failure. It paved the way for the passage of health legislation which has accomplished several of Biggs' objectives. These laws provide that whenever the board of supervisors of a county shall provide funds for the construction or maintenance of a public

hospital, clinic, dispensary or other public health activity, the county, subject to approval of the state commissioner of health, is entitled to state aid equal to the county expenditure. Thirty-eight counties now are receiving state aid for local health projects including five county departments of health, three county hospitals, three tuberculosis sanatoria, 28 county nursing and clinic services. In addition 18 counties and six cities are receiving aid for local laboratories. Altogether the state aid item amounts to \$565,366.49. Present laws exclude cities from participation in state aid except for local laboratories; they do not integrate the public health, medical relief and school medical services; and because of local inaction, relatively few counties have taken full advantage of their benefits. Also, the health centers now being established in New York City represent the form and some of the substance of the Biggs idea.

Increased Public Health and Medical Service.

During the past fifteen years public health activities have increased greatly. The State Department of Health budget has grown from less than one to more than four million dollars. All municipalities in the State now spend eighteen million annually for the conservation of health, eight million of which is for the control of tuberculosis. The state mental hygiene budget since 1920 has grown from thirteen to thirty million, and during 1931 the construction costs of mental hospitals exceeded twenty-two million. Public funds paid another twenty million dollars last year for treatment of patients in general hospitals; and ten million more for other special hospitals. Public expenditures for hospital care (except mental) exceeded the amounts paid by patients in the ratio of three to two. For home medical relief another \$2,018,147 were expended.

Altogether we are paying annually in this State from public taxes, for prevention of disease and care of the sick, about eighty-five million dollars, or more than \$6.50 per capita. This represents roughly 25 per cent of the

total expenditures paid for doctors, hospitals, dentists, nurses, drugs, etc. for all types of medical care. Large as are our present public expenditures for medical care and health, however, they represent only a small part of all governmental costs.

Expressed in terms of patients in general hospitals we find that of 871,104 patients less than one-half (404,329) are listed as paying patients. Considered on the basis of days' care, the proportion of private patients is even smaller, because of the excess of chronic and long continued illness among patients hospitalized at public expense. Paying patients last year received 37 per cent of the total days' care given in general hospitals and 29 per cent in all hospitals.¹

Clinics and dispensaries are furnishing a considerable part of out-patient service to the sick in this State. The medical profession need not fear the encroachment of health departments for operating public health clinics. I have attempted to ascertain how large a part of the total dispensary service is represented by public health clinics of various types. Last year a total of 2,271,043 patients paid \$,822,395 visits to dispensaries. Of this total, the volume of public dispensary service, not connected with hospitals, represented 473,347 visits. In other words, preventive clinic service by health departments comprises only 5 per cent of the total—a scanty drop in the bucket of free service supplied by hospital clinics and dispensaries.

If we study the Biggs' health center proposal in the light of present conditions, we find that time has emphasized the increasing importance of problems which he sought then to solve. Public health activities have increased. Facilities for public medical care have increased even more, yet this growth has been haphazard and uncoordinated and fails to meet current needs.

¹ For general hospitals: Private patient days, 4,181,241; public patient days, 7,321,709. For all hospitals except mental: Private patient days, 4,804,447; public patient days, 11,341,452.

This situation arises from the fact that standards of indigency applicable to the giving of public relief are not applicable to the giving of public medical care. A man may be entirely self-supporting so far as furnishing himself and his family with food, shelter and clothing, yet he may be unable to provide needed medical care for catastrophic illness. The data I have presented on the hospital problem, for example, bear out this point of view. Last year less than one-sixth of our population were relief charges. Yet less than one-half of the patients in general hospitals are paying patients. Moreover, the question of ability to pay for medical care varies greatly for the various conditions. Many persons can negotiate treatment for simple illnesses treated in the home and in the doctor's office, but they can not possibly meet hospital, laboratory and specialists' fees.

The extent to which public and eleemosynary agencies now furnish medical service to the people indicates that public medical care is an accomplished fact in many sectors of medical practice.

There is no real issue as to the public obligation for prevention of disease along lines generally accepted as within the scope of health department practice; nor is there any issue as to the need for giving all necessary medical services to those who are public charges. Moreover, it seems clear that in some fashion the public already is paying and will continue to pay for a large part of the cost of catastrophic illness among the marginal economic groups. These tax funds are supplemented by the unpaid services of physicians in hospital clinics and in private practice.

The issue about which organized medicine should and does concern itself is that of the method of paying doctors from tax funds for services now rendered and those not yet rendered but clearly needed, and the exact rules of patients' eligibility for particular services. For, as a matter of fact, large as are present tax payments for preventive and curative medical services, there is no more

system to it than in the bringing up of Topsy. The administration of these medical services is scattered among many and different agencies; widely different standards of service are in effect in the several communities of the State; and for all except the indigent any medical service is looked upon as charity degrading to the recipient, and an evil for the taxpayer.

Inadequate as is our lack of system for medical care, however, the patient is better off than the doctor. Relief funds cover most of the cost of home medical care for the unemployed and indigent. But nobody pays the doctor for the catastrophic illness, other than mental and tuberculosis, among the great body of those employed at a low wage.

Administration of Medical Relief.

Public welfare officials, in general, are unwilling to authorize medical care for any except the indigent and for them insufficiently. It is inevitable that welfare officers will give medical relief only to the same persons and on the same basis of adequacy as other forms of relief, viz., the pauper level. This is true, even though the present provision of the State Public Welfare Law (Article 10) makes it a responsibility of the welfare district to provide all necessary medical care for persons under its charge, and also for persons otherwise self-supporting who are unable to provide themselves with needed medical care. A liberal interpretation of this legal provision would solve at one stroke the major part of the present problem. The provisions of this law, however, need to be made more specific and its administration transferred to local health departments if its intent is to be realized.

Health departments are better fitted by training to administer medical care given at public expense than are the welfare departments. Biggs recognized this in his health center plan. The history of our care of the insane, of the tuberculous, of crippled children, and of the venereally infected shows that one after the other these functions

have been transferred from the "Poor Law" administration to a separate medical administration or to health departments in order to make the service available to others than "paupers" and "indigent poor".

Moreover the time has long passed when we can separate the preventive services of a health department from curative medical service. Prevention and cure, in fact, are a unit problem in reducing morbidity and mortality and should be integrated and administered by health departments, state and local, in so far as such services are paid for by public funds.

The legal steps necessary to bring about integration of public health and medical activities would be easy of accomplishment if the medical profession were to present a united front in demanding the change. Could the profession be persuaded of the wisdom of this, I believe the needed legislation would result under their leadership. As it is, medical and health activities are now scattered in the several departments of the state government, usually under the control of non medical personnel and frequently are a minor phase of the department's work. The State Social Welfare Department supervises, inspects and licenses hospitals and clinics; the State Temporary Emergency Relief Administration renders medical relief to that large sector of the population under its charge; the Education Department has responsibility for the medical inspection of school children; and the Labor Department looks after the health of industrial workers. I propose amendments to the state laws which will give the State Department of Health responsibility for these several scattered health functions.

I propose similar changes in the law transferring responsibility in the local units of government from the welfare and education authorities to the local health authorities. These increased responsibilities necessitate better organized local health units, particularly in the rural areas, and better trained personnel.

In recommending the integration of public efforts for the prevention and cure of disease under the single administration of health departments, state and local, I recognize that in this city the hospital problem and in this State the care of the insane may be problems of such size as to necessitate a separate administration. I think, however, that the principle of divesting the welfare and relief agencies of responsibility for medical care is sound, if we accept as a premise the necessity for furnishing such care to those in the margin above the pauper level.

Methods of Giving Medical Care.

There was need in 1920 for an improved health service for all citizens and for better medical care for the lower income groups. The Biggs plan was a bold, straightforward method of providing such services. No one denies that the need of 1920 is greatly increased in 1935. This is due in some measure to the continued advances of medical science increasing both the cost and the complexity of medical service, as well as to the better education of the public in health matters increasing the demand for service; and in large part, of course, to the lessened income of a larger part of the population which places any service beyond its reach.

Most serious is the economic barrier between the physician, competent and anxious to render service, and the patient needing the service. Two general methods are proposed to break down this barrier: health insurance and state medicine. Both methods propose to spread the cost of medical care "over groups of people and over periods of time." The only essential difference is that under health insurance the funds are contributed chiefly by employee and employer; under state medicine chiefly through taxes. In any system of compulsory insurance the State also contributes to the cost, since public charges have no income to contribute, and those on a bare subsistence wage can not make a sufficiently large contribution to provide medical care. Contributed funds do not usually suffice for treatment of mental disease and tuberculosis, which are

expensive forms of care. General taxation, therefore, is used to supplement contributions to health insurance funds. Thus publicly supported medical service, or what is commonly termed state medicine, is an essential part even of contributory health insurance.

From one point of view, even the weekly contribution of the wage earner can be considered as taxation. There is this important difference however: The cost of health insurance is borne chiefly by the low-income group of the population. It falls most heavily upon those least able to pay. In this way it differs from general taxation which, in theory at least, assumes payment of taxes in proportion to ability to pay. State medicine contemplates general taxation as the one source of pooled funds for medical care.

Either health insurance or state medicine may include the whole population, or only that portion of the population having less than a specified maximum income.

Considerable variation is possible also in the nature and extent of services to be rendered under either plan. As in the British plan it may be limited to the services of a general practitioner for the wage earner alone. The family may also be included. The services of specialists may be provided. Hospital care may be provided by insurance, alone or as a part of a general insurance system. Dental care, home nursing, drugs, orthopedic appliances or other accessories; one or more may be included.

In addition to one or more of the above medical benefits, cash payments for wage losses usually are provided under health insurance.

The theory supporting any system of socializing medical costs lies in the fact that illness for the individual family is an unpredictable risk, and for individual families of small income the cost can not be borne by the individual wage earner. The public medical services now being rendered spread the risk, or socialize the costs. The same principles would hold true if present public medical care were extended to include the treatment of other diseases or of other economic groups.

The advantages and disadvantages of health insurance have been so widely disseminated to the medical profession that it is unnecessary for the present purpose to repeat them. I point out merely that insurance contributions are but another form of taxation and that, *vice versa*, taxation is one way of making contributions for the support of services rendered for the public good. Similarly, under either system, the services of physicians may be compensated through fees, capitation, or salary.

A practical point often overlooked is that a considerable part of the cost of medical service under health insurance is for the care of ordinary illnesses treated in the doctor's office and in the patient's home. In my opinion the cost of such illnesses are no more appropriate for insurance than the periodic payment of rent. The cost falls more or less evenly and is more or less predictable. It is serious illness of catastrophic type and of chronic nature which presents the greatest problem to the person of small means. The practical difficulties of administering insurance directed entirely against the catastrophic illness, however, have prevented the adoption of this limited type of insurance in European countries with other forms of social insurance. Hospital insurance, on the other hand, is an insurable entity which is gaining in favor in this country.

The Additional Care Needed.

Studies by those interested in providing security against the hazards of life to the person of small means show that those in the lower income brackets can not provide through voluntary savings security against old age and against the loss of a job. Certainly they do not. Therefore current Federal plans for social security embrace within the provisions of unemployment insurance persons having an annual income of less than \$3000, and within the contributory old age annuity plan those under the \$2500 limit. Similarly such persons can not or do not budget against the unpredictable cost of serious sickness. Their failure to do so results either in no care for them or no pay for the doctor.

As we have seen from a brief review of the present types and the present extent of public medical care, we have already socialized, that is, distributed the cost of a large part of hospital care, a large part of medical care for the insane, for the tuberculous, for the venereally infected, for crippled children and for the treatment of many chronic illnesses. Where tax supported, the distribution of cost has been equitable. Otherwise it has been at the expense of the doctor. It seems necessary to extend these services to include other diseases for which the individual himself can not negotiate the cost. It seems reasonable also to extend to the doctor a fair compensation.

The groups needing public care for costly illness might be defined as including: all manual laborers and their families, all persons participating in the proposed old age annuity plan or unemployment insurance, and all others having an annual income of less than \$2500. It is not necessary, nor do I propose to furnish these groups with general medical care for the usual illnesses of short duration. In determining the diseases and conditions which should be cared for at public expense, consideration must be given to the cost of treatment and the extent to which the particular disease or condition is "endowed with a public interest." By this term I refer either to the communicability of the disease or to its social importance, and to the practicability of reducing present mortality and morbidity rates therefrom. We need to provide at public expense, in whole or in part, such types of medical care for the lower economic groups of the population as: facilities for accurate diagnosis, obstetrical care, hospital care, home nursing and treatment of chronic diseases.

Facilities for accurate diagnosis would include consultation and advice as to treatment by medical and surgical experts; clinical, pathological, and chemical laboratory services; and x-ray facilities. These services would be available for any person in the above defined income groups upon recommendation of the family physician. Such accessory costs are frequently necessary for intelligent treatment.

If they be supplied at public expense the traditional relation between the physician and patient can be preserved longer than at present. In this application, socialized medical services are an aid to the doctor, not competition. The specialists giving the service should, of course, be compensated on a basis agreeable both to the taxpayer and the profession.

Our present lack of good obstetrical service results in an excessive mortality rate of women in childbirth. From best available evidence, this death rate can be reduced by two-thirds if adequate care were available and were utilized by every pregnant woman. Present public health efforts to reduce maternal mortality fall short in not being able to assure to the woman continued competent medical service under the same physician throughout pregnancy, childbirth, and the puerperium. In practice the doctor frequently is not called until the woman is in labor; often he is unpaid. Medical care furnished on the basis of medical need rather than pauperism is the one direct way of meeting this important health problem.

Hospital care is a major element in the whole cost since care in general hospitals at public expense approximates two-thirds, and in all hospitals totals about three-fourths of the total patient-days. A relatively small increase in public expenditures would provide hospital care to all in the lower income group. The present lack of system in giving hospital care degrades the patient and degrades the service. I would propose hospital care, without the frills of special nurses and private rooms when unnecessary from a medical standpoint, be given as a matter of right at public expense for the lower economic groups without making it necessary for them to cheat or beg for it.

Nursing care in the home now is furnished inadequately, especially in the rural areas. In the cities visiting nurse associations are meeting a part of the problem. I see no way to make this service adequate for the need except through additional tax support.

Tuberculosis, syphilis, cancer, and such other chronic diseases as arthritis and rheumatism require long continued and expensive care and frequently the collaboration of several specialists, if best results are to be had. The public is now caring for eighty per cent of the tuberculosis hospitalization, for two-thirds of all syphilis treatment, and for a considerable part of cancer and the other chronic diseases.

It would be relatively simple to provide treatment for the catastrophic diseases and diagnostic facilities for obscure conditions as a matter of right available freely to persons in the lower economic groups I have defined.

In general, the medical services which I think should be socialized are those for which the doctor now gets little pay or none at all. Under the plan I propose, physicians giving the service would be much better compensated than at present. The doctor is the only member of the community whose services for the care of public charges are commandeered without compensation. I think it is absolutely necessary that physicians now serving in the dispensaries and on the staffs of hospitals be compensated for their time and effort. These dispensaries were designed for the case-load of prosperous times. Crowded as they now are, many persons even on relief prefer no treatment at all to what they must now endure to get casual and superficial treatment. I am less concerned about the admittedly small percentage of dispensary patients able to pay fees to a private physician than I am about the much larger number of sick people getting inadequate care. To provide an adequate and decent medical service to our public charges and to extend to the low income group treatment for the "catastrophic" and chronic illnesses requiring costly diagnosis and long hospitalization is a necessary public health obligation. I believe that in the long range it will be financially profitable, through the lightening of our ever growing load of unemployables. And, I believe that Doctor Biggs would stir anew to the spirit of his thesis of 1882—"There are other considerations far higher

than the financial which render government action in regard to the public health imperative."

I am convinced that in this State an integrated plan of public health, public medical service, and private practice is preferable to health insurance. Under such a combination the doctor would retain everything now satisfactory to himself and his patient; he would be aided by public accessories to practice and by compensation for the present unbearable load of free service; there would be no disruption in the physician-patient relationship for the large sector of medical practice in the home and in the doctor's office. For those above the job insurance level there would be no change in present methods. This plan would represent an evolutionary process based upon considerable experience. It would provide care freely for the catastrophic and expensive illness of the low-wage group now poorly served or served at the expense of the physician. It would remove the major economic hazards of illness. It would reduce present high disease and death rates from important preventable causes, and advance the public health tremendously.

The whole effort for human betterment has been handicapped because in this nation medicine has not been and is not now a vital force in the councils of government. Through the integration and union of needed preventive and curative medical efforts and through the provision of public medical care, as a matter of right and not of charity for those in need of it, medicine can assume its rightful position of leadership in humanizing society.

The most vocal members of the medical profession up to now, however, have been filled with the fighting spirit of the guilds and trades unions. They have been concerned primarily with protecting the *status quo* and in opposing so-called inroads upon their traditional prerogatives. But the rank and file of medical men have quietly and patiently been carrying the load of unpaid service for their unfortunate fellow men. They could do this easily enough when medical charity was required for no more

than two per cent of the average practice. Now, unfortunately, many a formerly prosperous doctor has been almost overwhelmed by the need for free service among his patients. Yet still these unsung heroes of medicine have carried on. They have taught us that in the future we must be concerned about medicine as an instrument for human happiness.

Hermann Biggs combined the qualities of a great clinician, a great teacher, and a great public health leader. At the bedside, in the lecture room and in public office, he advanced the science of medicine in its individual and public aspects. Our greatest need today is for men like Biggs in the medical profession.

Biggs had an orderly and a logical mind. These qualities tempered his idealism and his professional vision. "Think things through" was his motto. No one before or since his time has combined with such idealism so practical a program for meeting the public health and medical needs of his State. Had his health center program of 1920 been adopted in New York State and carried out in the several communities, we should have today no such serious problems in medical care and medical economics as now confront us.



OBSERVATIONS ON TUBERCULOUS ABSCESS OF THE CHEST WALL *

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I have in mind, in presenting observations on tuberculosis of the thoracic wall, discussing some of the phases of the delicate balance between infection and resistance presented by local extrapulmonary foci of tuberculosis.

I approach the subject from the standpoint of one whose experience has been gained from observing and treating local tuberculosis of many of the different tissues and anatomical systems and not from the point of view of one who has devoted himself exclusively to the treatment of one anatomical system.

It has come about today that the treatment of tuberculosis of bones and joints falls largely to the orthopedic surgeon, tuberculosis of the genito-urinary tract to the genito-urinary surgeon, tuberculosis of the ovaries and tubes to the gynecologist, tuberculosis of pleura and lungs to the physician and those giving special attention to thoracic surgery, tuberculosis of the eye to the ophthalmologist, of the skin to the dermatologist. Tuberculosis of the gastro-intestinal tract and peritoneum and tuberculosis of the lymph glands fall to the general surgeon.

There is an obvious advantage in this surgical specialization, especially from the side of technique; suitable instruments are devised for diagnostic purposes adapted to the various regions under inspection; greater familiarity with normal and morbid anatomy of a given region is attained, from dealing with a considerable number of lesions of a given anatomical region. Operations are thought out and executed with greater skill than could be obtained by one treating but occasionally, similar condi-

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tions. I cannot help feeling however that there is a certain advantage in seeing and being familiar with the various manifestations of a specific generalized infection and of seeing the modification of the lesions caused by the same infecting agent brought about by the texture of the different tissues and the structure of the different anatomical regions. It is an advantage to be able to study the succession of lesions in different parts of the body and to have brought to one's attention the relation of the lesions to one another and to the phases of infection and resistance.

Tuberculous abscesses of the thoracic wall are not common. Few have the opportunity of reporting a large series of cases and yet they are sufficiently common for almost every physician or surgeon to see several instances. My own experience is derived from 18 cases that have come under my observation. The lesions have all been in adults, eleven men, seven women. Five were of the negro race. Three were over fifty-five years old.

I have been interested in these lesions because of their indolent course, their tendency to persist after excision, and by the fact that the foci occur in a region in continuous movement, every respiratory effort altering to some extent the position of the wall of the abscess or fistula. Their association with other lesions and the controversies over the site of the distributing focus and the differences of opinion expressed as to the method of treatment and the excellent results following the radical removal of the foci, have all arrested my attention.

The disease, as Koenig¹ expresses it, begins for the patient and the physician with the recognition of a swelling. This swelling progresses slowly with little or no pain. It is hemispherical when situated over the sternum or sterno-clavicular joint, and oval with the long axis parallel with the rib when situated on the lateral chest wall. Sooner or later the swelling softens and breaks through the skin or is incised by a physician, leaving a fistulous tract. The orifice of the fistula may heal and then a new opening forms at some distance from the first; gradually complicated fist-

ulous tracts develop so that considerable areas of thoracic wall are undermined and openings are found far from the original focus. At first there is little disturbance of health, the body temperature is usually hardly altered. In other words the disease presents itself as a painless tumor or as an intractable fistulous tract which annoys the patient by the necessity of using a small dressing to take up the discharge.

I have followed the teaching of Watson Cheyne² and Koenig⁷ and other surgeons of thirty or more years ago and have attempted to remove the entire local focus of infection. The anatomy of the region makes it possible to carry out a radical removal of the diseased area without undue difficulty and without mutilation.

If there is an unopen tuberculous abscess, the attempt is made to remove it by a sharp dissection. It will usually be found passing to a rib or a costal cartilage, the junction of rib and cartilage or a portion of the sternum, or the sterno-clavicular joint. These structures are carefully removed with the sac.

The rib is removed well beyond the area involved and the costal cartilage when involved is completely removed, dividing the rib just beyond the costo-chondral junction and removing the costo-sternal junction completely. At times the tuberculous sac leads to an intercostal space, a small point or several points of granulation mark the spot where the tuberculous process has found its way into the cellular tissue of the thoracic wall. If a probe be passed along this granulating tract it will be found leading beneath one of the ribs or rib cartilages and a removal of this rib or cartilage exposes a secondary abscess. Although the walls of the sac removed show tuberculosis, occasionally neither the rib nor cartilage show any tuberculous infection. The deep wall of the cavity after the rib is removed is made up of the endothoracic fascia and the pleura. When the granulation tissue is removed from the endothoracic fascia, I have in no instance found a defect leading to a focus in the pleura nor have I removed tissue that had the appearance of a lymphatic gland.

When fistulae are present I have attempted to remove them in much the same way, carrying the dissection into the sound tissue about the fistulous tract, circumscribing the orifice and following the tract to its origin. In most of the patients with fistulae, one or more operations had already been performed, usually incision, curettage and packing. These fistulae have often been very extensive and complicated, in one instance reaching from the fifth rib nearly to the crest of the ileum with numerous side canals. In one patient the fistulous tract led to an opening in the pleura and on removing several ribs and the underlying wall a considerable cavity was exposed. A section of the wall showed a thickened tuberculous pleura. The patient had had a tuberculous empyema which had been opened without recognizing the nature of the condition.

When in the course of dissection it has been necessary to remove portions of the costal cartilage there has been a tendency for the cut end of the cartilage to become infected and the fistula to persist, not from the original focus but from one created by the operation undertaken for its cure.

This tendency of the severed costal cartilage to become infected has been noticed by a number of surgeons and has led to the practice of removing the entire costal cartilage.

If the process involves one of the lower ribs, carrying out this principle may make necessary an extensive operation. In one instance in which the focus was in the sixth costal cartilage, permanent healing did not take place until the entire plate of cartilage, made up of 6, 7, 8 and 9th costal cartilages, with corresponding portions of ribs was removed. I have closed the skin with interrupted sutures without drainage after painstaking hemostasis. It is well known that secondary infection is prone to find its way along material introduced for drainage.

From findings at operation it is evident that the rib, costal cartilage, sternum, the sterno-clavicular joint, the pleura and possibly the subcutaneous tissue may all be sites of a local tuberculosis.

It has been contended, especially by French writers on this subject, that tuberculous abscesses occur unrelated to an involvement of the bone, cartilage or lymph glands. They are spoken of as tuberculous gummata. They are described as appearing as small tumors in the subcutaneous tissue, at first not adherent to the derma and independent of the deeper tissues. They soften and break down producing a typical cold abscess. As they increase in size they invade neighboring structures, by extension of the tuberculous process.

Tubercle bacilli seem to lodge and grow in synovial membranes, in bones, lymph glands, bursae and synovial sheaths of tendons and not usually in the subcutaneous cellular tissues. In seeing a cold abscess one immediately thinks of a focus in one of these structures. I have never seen an isolated subcutaneous focus unrelated to these structures.

It has further been advanced and demonstrated that certain of the abscesses have their origin in the pleura. A number of autopsy reports and careful observations were presented by Soulignoux³ in his Paris Thesis, forty years ago. He showed lymphatic vessels of adherent pleura communicating with those of the intercostal space. Normally little developed and incapable of being injected with mercury they are, on the contrary, large and easily injected in cases of inflammation and adhesion of the pleura, making a communication between lymphatics of the lungs and those of the intercostal space.

Robinson⁴, in the reports of the Mayo Clinic, in 1917, basing his conclusion evidently on evidence presented by Soulignoux and the negative findings in the ribs in patients he had treated, assumed that the abscesses were usually pleural in origin. Auchincloss⁵ showed before the New York Surgical Society, twelve years ago, a patient on whom he had operated for a thoracic abscess. After removing the fifth and sixth ribs and the intercostal muscles he exposed a sinus about a half centimeter in diameter which led to a sheet of calcified tissue. He dissected out at a second operation, this sheet. It lay over the lower part of the

lung, the diaphragm and the outer part of the pericardium. Evidently tuberculous infection of the pleura is the source of the cold abscess in some instances.

I surmise that in the limited number of instances that come under any one surgeon's observation, different conclusions may be drawn as to the site of the focus of infection. Sayag⁶, in his thesis on the study of cold abscess of the thoracic wall reported forty-five cases, thirty-eight were children and seven adults. In thirty-one there was a lesion of the ribs or costal cartilage alone without any lesion of the pleura. In seven there was a cold abscess of the soft parts without any lesion of the ribs or pleura. Pleural lesions were connected with the thoracic abscess three times in forty-five cases.

Koenig⁷ in his article on tuberculosis of the chest wall found the usual focus in the ribs, costal cartilage or sternum. At times the focus was subperiostal, at times in the medullary substance and at times in the perichondrium or at the junction of the rib with the cartilage. He shows six figures of different forms of lesions of the periosteum or bone that had come under his observation. Only once had he seen invasion of the rib from a focus in the pleura. In my series, the pleura was the infective focus in one of the eighteen cases. In this instance it was rather a tuberculous pleurisy than the condition described by Soulignoux.

In the great majority of cases the infection must therefore reach the rib, the sternum, the sterno-clavicular joint or possibly the soft parts or the cartilage by the blood stream, not by spread through the lymphatics from the lungs. This is borne out by metastatic lesions, preceding, following or occurring at the same time as the thoracic lesion. Tuberculosis of the malar bone, the gluteal bursa, the ankle joint, the testicles, the knee joint, the lymph glands have occurred in various combinations with the thoracic lesions, in the patients I have observed.

The x-ray findings of the lung showed in three cases of the eighteen, evidence of active pulmonary lesions. In others the x-ray examination or the physical examination

showed no lesions in the lungs or only signs which might be interpreted as healed lesions. X-ray examination of the chest wall in no instance showed the lesion in rib, cartilage or sternum. The superficial process in the bone evidently does not reach a size sufficient to be recognized before it has set up an abscess easily appreciated in the chest wall.

The results of local removal of the tuberculous process has resulted in local cure in twelve, in six a sinus persisted. Of the twelve patients locally healed, in one there is still evidence of a lung lesion. This patient has gained twenty-five pounds and the lesion in the lung is apparently commencing to cicatrize. The patient with a very complicated and extensive fistulous tract when seen last, nineteen years after his operation was hale and hearty and eighty-two years old. The patient in whom it was necessary to remove the entire mass of the sixth, seventh, eighth, and ninth costal cartilages, and considerable portions of the adjacent ribs, is alive and well at seventy-four, fourteen years after operation. Seven have been seen two, four, six, nine and fourteen years after operation. I have been unable to follow six of the patients. One was well two years after operation, one returned to Italy with a sinus still present. Two died within two years of their operations from tuberculosis. Nine have had multiple operations. All have been kept under observation for a year and as a second focus was appreciated it was excised. There has been a pronounced gain in weight and in general health following the excision of the foci and final healing.

One year ago a patient came under my observation who illustrates so well features to which I wish to call attention that I will report the case in some detail. A vigorous negro was admitted to my service in St. Luke's Hospital complaining of a lump over the right upper portion of the chest. He had no pain, the mass was not tender, there was no pain on moving his arm. His past history was negative except for a swelling on his cheek which had disappeared spontaneously. X-ray was negative except for diffuse haziness overlying the upper portion of the left chest. There was no evidence of a lung lesion. The mass over the upper

left chest was hemispheric, soft, fluctuating, the size of a large cocoanut. The swelling was aspirated and one thousand cubic centimeters of thin white pus withdrawn. A guinea pig inoculated with some of this material showed lesions which yielded acid fast bacilli. Several of the surgeons who saw the patient advised that the abscess be repeatedly aspirated and that he be transferred to Sea View Hospital for open air treatment. The point of view expressed was that experience has shown that it was undesirable to incise a tuberculous abscess, that the walls regularly became secondarily infected, that tuberculosis with secondary infection progresses more rapidly and rarely heals. The patient, they said, would be given a better chance to overcome the infection by suitable climate, fresh air and sunshine. I dissented from this opinion and advised that the abscess wall be excised and the focus in the sternum or rib removed and that he then should be given the treatment suggested. The operation was performed by Dr. Heeks of my staff. An incision was made down to the wall of the cavity. The contents of the cavity were aspirated and as much of the wall as possible excised by sharp dissection. The first rib was disarticulated from the sternum and its medial third excised, the clavicle disarticulated from the sternum and its medial third excised. The portion of manubrium adjacent to the articulation was removed. The severed muscle fibres of the pectoral were brought together by sutures and the skin wound carefully sutured. A small rubber dam drain was inserted near the angle of the wound.

Microscopical section of the tissue removed showed the bony fragments widely involved with tuberculous granulations, the tuberculous tissue extending as far as the cartilaginous covering of the articulation. There were a number of large tubercles with typical Langhans giant cells and a small amount of cheesy degeneration. The day after operation the evening temperature was 101.2. This temperature gradually subsided and was normal on the sixth day. He left the hospital on the fifteenth day with the wound healed except for a small sinus at the site of the cigarette drain.

He was sent to the country and told to rest and keep in the open air as much as possible. He returned four months later, apparently in excellent health, the wound healed except for persistence of a small sinus but a swelling had appeared over the left malar bone. It was painless, not tender and fluctuating. The skin over it moved normally. He was advised to have a second operation.

The skin was dissected from the swelling, the abscess opened. The pus was beneath the periosteum, there was a distinct punched out area measuring about one centimeter, in the underlying bone. The adjacent tissue was cheesy and easily removed with a curette, the tuberculous periosteum and the wall of the cavity were excised and the wound closed without drainage. The wound healed by first intention. The patient was again sent away. He returned after a month with both wounds soundly healed and begging that he might be permitted to return to work. When seen several weeks ago he was well and earning his living.

In this instance there was no evidence of secondary invasion of the bone by extension from the pleura. The infection must have reached the bone by the blood stream. The lesion in the malar bone is further evidence of metastasis. Why did this, to all appearance, healthy man present a large tuberculous abscess without appreciable constitutional symptoms? Why did he heal so promptly when the local lesion was excised? What are his chances of later developing chronic tuberculosis of the lung? Why should he have had a second lesion in the malar bone?

The answers to these questions bring up the whole question of the phases of tuberculous infection and superinfection.

I believe it of some value to surgeons to take cognizance of the ideas that are being developed regarding the sequence of lesions in tuberculosis, even if the views held are tentative, and obviously subject to revision.

In the sixth edition of Bruns' Handbook of Surgery, published in 1931, in the chapter on the surgery of the chest,

Professor Herrmannsdorfer writes, "Tuberculous inflammation attacks the chest wall itself. In the secondary stage (Ranke) the inciting agents gain entrance to the blood stream and are deposited in the ribs, sternum or soft parts." In publications on various aspects of infection with tubercle bacilli, one is beginning to see the terms primary, secondary and tertiary tuberculosis used.

Ranke⁵ expressed his views in a lecture delivered in Munich in 1917. He said that his aim had been to find some law expressing the relation between the manifold manifestations of tuberculosis and to explain their sequence with reference to the laws governing the course of the various infections. He had reached his conclusions after many years of pondering on clinical observations and pathological examinations.

The tubercle bacillus and its toxins were typical antigens and the stages from the appearance of primary lesion to the late manifestations were the expressions of the reacting organism modified by a gradually increasing immunity.

The primary effects had already been studied and demonstrated by Kuss and later by Albrecht and Ghon, and Hamburger from clinical observations had already suggested this division into stages.

The primary stage gives a characteristic anatomical picture. It is seen usually in childhood and youth. It is confined to a small area in the lung, the neighboring lymphatics and lymph glands. It is limited to these structures and the involvement of the lymph glands is retrograde. Not only has this primary lesion a characteristic histological structure, but it heals in a characteristic manner so that one familiar with the lesion should be able to tell from the healed scar its primary nature.

When the primary lesion does not heal, a secondary stage sets in. It is characterized by widespread dissemination by the lymphatics, by the blood stream, by spread on serous and mucous surfaces and by progression by contact growth. The lesions are characterized by rapid exudation and case-

ation, at the same time highly increased sensitiveness to the toxins of the bacilli is developed.

Gradually this reaction to the toxins diminishes and a gradual development of immunity sets in. There is a regression of lymph and blood stream metastases and a retrogression of the perifocal exudative inflammation. The regional lymph glands become gradually smaller in relation with the volume of the organs to which they belong and finally almost completely disappear. Further, metastases by the blood and lymph stream no longer occur but contact invasion and spread in an infected organ may continue.

The tubercle bacilli which have been transported and deposited in the lymph glands lose in this stage their capacity for multiplication and for the production of toxins, the bacilli are much changed if not actually dead. In any event they are rendered harmless.

At the end of the stage of generalization a stage follows marked by humoral immunity and a relative insensitivity to the toxin. Local disease, shut off largely from the blood and lymph, exists and may progress.

There is much evidence which confirms these views of Ranke. Aschoff⁸ writes that the histological characteristics of the primary lesion and the appearance of the healed primary lesions have been generally accepted by the scientific world.

That there is a period of dissemination seen often in childhood, is obvious to all who have had the opportunity to study and observe in infancy the widespread glandular involvement, the appearance of multiple lesions, the rapid invasion and spread of local lésions.

That there is a third stage in which local more or less shut in or encapsulated foci appear which yet progress locally by extension without glandular involvement and with a very chronic course, is also obvious.

The proof that some such sequence is followed is furnished by observations made on adults who have not lived

under conditions where they were exposed to tuberculosis in infancy and childhood and in whom the primary complex and the secondary anaphylactic phase can be studied and followed. Thus Aschoff⁸ writes, "I have observed most serious cases of infection in a very large number of autopsies of Anatolian peasants, who came from mountain villages and in whom it was impossible to find any trace of previous phthisis. Here we found pictures like those usually seen in childhood during the stage of generalization." Borrel⁹ in studying tuberculosis in the Senegalese troops in the French army, showed that it differs completely from the tuberculosis seen in adults in urban communities. The disease presented a very great analogy with the course of severe tuberculous infection in young children.

Borrel showed that only 4 per cent of the Senegalese soldiers gave a positive reaction to tuberculin. In those who did not react and had never been infected with tuberculosis the disease ran a severe course presenting two phases, one with no fever and few constitutional symptoms but with glandular involvement corresponding to the territory invaded, lasting two or three months, and a secondary stage characterized by fever and generalized lesions with caseation. The second stage was short and resulted fatally.

Inoculation experiments on animals have made clear that superinfections and the intervals of time between infection and superinfections as well as the dose and virulence of the organism profoundly alter this picture.

The classic experiment of Robert Koch¹⁰ made in 1891 and which led to the discovery of tuberculin was the starting point of investigations that have elucidated the question of superinfection and the modifications in the course of the disease.

"If one inoculates a guinea pig with pure culture of bacilli the puncture heals normally. From the tenth to the fifteenth day there appears at the point of inoculation a hard nodule which soon opens and produces an ulcer which persists up to death. Guinea pigs already infected from

four to six weeks, then inoculated a second time behave very differently. A nodule does not form at the point of inoculation, but on the next day or the day after, the point of inoculation becomes hard, takes on a reddish violet color, then becomes blackish over an area of 0.5-1 centimeters. In a few days the skin becomes necrotic, sloughs away leaving a superficial ulcer which heals rapidly and definitely without involvement of the neighboring glands."

Thus tubercle bacilli act very differently when inoculated under the skin of a guinea pig already tubercular than when under the skin of a healthy animal. In animals heavily infected this phenomenon does not take place. A relatively small dose is then rapidly fatal.

During the last forty years this experiment has been repeated and confirmed. To produce the phenomenon however, the original dose must be small, just sufficient to produce a chronic disease and the second inoculation must be a minimal dose.

The condition under which children live, especially in urban communities, exposes them to contacts usually intermittent, and in small doses, initial invasion can take place without clinical manifestation and reinfection, or to speak properly, superinfection (for reinfection implies a complete recovery and destruction of the original invading parasite) may be delayed until some degree of immunity is established. Clinical tuberculosis occurs when the virulence, the size of the dose, or the timing of renewed infection breaks down the defense mechanism.

Tuberculosis then, as seen clinically presents a great variety of pictures due to the timing of the exogenous and endogenous superinfection, as well as the size of the initial dose, and virulence of bacilli. And generalization occurs in the non-sensitized body, the body more or less resistant, and the body highly resistant. Saenz¹¹ in the Bulletin of The Pasteur Institute in 1933 made a report on blood cultures in patients with tuberculosis. He had developed a special technique and was able to find 5.2 per cent positive cultures in 500 examinations. The positive findings were largely in

infants and were determined before the appearance of allergy and before the signs of tuberculosis recognizable by clinical methods. It has always seemed to me that as micro-organisms were mostly immobile an indication of their behavior when first introduced is given by the fate of particulate matter introduced into the circulation. It is well known that when minute particles of carbon are introduced into the ear veins of rabbits they disappear from the circulating blood and are found scattered throughout the body but are deposited especially in catch basins such as are furnished by the anatomical arrangements in the lymph glands, the bone marrow, the liver, and the spleen, where conditions are such that particles carried along in the circulating blood have a tendency to settle. The circulating bacilli are largely taken up and destroyed in these regions. In this destruction the tissue gradually acquires the property of hypersensitiveness. Where the bacilli are deposited in sufficient quantities they may overcome the local defense mechanism and start to grow. As they multiply they may again disseminate but this time in a sensitized body and where they lodge there is rapid swelling and destructive inflammation.

Hypersensitiveness may develop to such degree that it is itself a danger from the destructive progressive lesions produced, although high immunity exists. Further, local lesions may occasionally occur in the intima of a large vein or thoracic duct. If such a lesion breaks into the lumen of the vessel, necrotic fragments and multitudes of bacilli will be carried throughout the body at a time when considerable allergy has been established, thus producing the various forms of miliary tuberculosis.

The attempt to place tuberculosis of bone, joint, lymph glands and other forms of extrapulmonary tuberculosis in relation to these phases of infection is interesting. They belong to a group of lesions which for many years were called scrofulous and had characteristics which made it difficult for older clinicians, before the discovery of tubercle bacilli to consider them tuberculous. The lungs in many

instances were not involved, there was no evidence of pulmonary tuberculosis, or it appeared late in the disease and ran a very chronic course. Further, adults with chronic pulmonary tuberculosis rarely showed extrapulmonary lesions.

The law of Marfan quoted by Calmette¹² is also in agreement with the older clinical observations. "One almost never finds evidence of pulmonary tuberculosis in subjects who during infancy have been attacked with tuberculous adenitis and who have recovered completely before the age of fifteen, this recovery having taken place before any other focus of tuberculosis has been appreciated."

Evidently the usual forms of adult pulmonary tuberculosis are the result of exogenous superinfection of the lung. And when such a pulmonary lesion becomes established, sufficient immunity is produced to prevent the formation of extrapulmonary foci.

Conversely, when during the course of generalization, due to mass action of the bacilli, or locally diminished resistance, one or more local extrapulmonary foci develop, they have a tendency to establish enough immunity to prevent superinfection of the lung.

Further, the timing of superinfection in groups of lymph glands may set up such immunity that renewed infection in other parts of the body is extremely unlikely.

Thus the tuberculosis that the surgeon sees and treats is a form in which enough resistance has been established to make local lesions of considerable size and enough sensitivity to make local destruction. He frequently sees patients with but a single lesion representing the end stage of a generalized infection in which the defense mechanism had destroyed the invading bacilli except where their mass action has been able to establish a foothold. He sees, not infrequently, multiple destructive foci with apparent high immunity. And he sees patients with slowly progressive local destructive lesions which slowly advance and gradually break down the defense mechanism. He is not called

on to treat the patient in whom the defense mechanism is so efficient that there is no clinical evidence of the bacterial invasion and he is not called on to treat overwhelming invasion or metastases in the early stages of generalization. His patient falls in the group where the forces of the invading bacillus and the forces of the invaded body are nearly equal or are largely on the side of the invaded, and the foci are accessible.

Many of the instances of bone and gland tuberculosis give evidence of frequently repeated inoculation with bacilli of low virulence. Thus Fraser¹³ in studying a consecutive series of seventy cases found evidence of bovine bacillus in forty-one. The medium was milk and the manner of inoculation was by ingestion. It would seem likely that the patients who presented similar lesions and in whom the infection was due to the human bacillus may have been infected in the same way by bacilli of low virulence or in very small doses ingested by sucking soiled fingers and putting all manner of objects in the mouth in children growing up in a household where one or more members had an open tuberculous lesion.

In these instances the bacilli ingested passed through the sound intestinal mucosa. The tubercle bacillus is thus carried and distributed throughout the body without any lesion in the area of inoculation. Such a path of invasion has been repeatedly demonstrated. The mechanism of absorption and the path of invasion is presented by Calmette in his book on Tuberculosis. Moreover the animals examined showed no lesions in the mucosa. That is one of the observations that caused Calmette to deny the law of Cohnheim, a law that states that the point of invasion of pathogenic microorganisms is marked by definite lesions. An interesting confirmation of the absorption through the intestinal mucosa has been furnished recently by Saenz in the paper already referred to. Specimens of blood taken from infants cultured for the tubercle bacillus three to five hours after the ingestion of a dose of a nearly avirulent bovine bacillus (BCG) were positive in three out of four examined. Two chimpanzees were inoculated by ingestion of BCG. Four

hours later blood was withdrawn and cultured for tubercle bacilli. Positive cultures were obtained in each instance.

Similarly Park and Krumwiede¹⁴ showed in children under five with cervical adenitis, the bovine bacillus in twenty-one instances and the human bacillus in fifteen, and in children from five to sixteen, in twenty-one the bovine and in thirty-six the human bacillus. Here again the significant fact seems to be that repeated inoculation by organisms of low virulence (bovine or human) introduced in a special way can set up lesions which are confined to the lymph glands and run a relatively benign course.

The comparison of tuberculosis with syphilis is broken by the effects of repeated small superinfection so timed that many of the patients never pass through any such sequence as is described by Ranke.

The comparison with glanders shows a far greater resemblance. Glanders as seen in man is a generalized and usually fatal disease and yet Dr. Hitzrot¹⁵ showed before the New York Surgical Society twenty-three years ago a man on whom he had operated for a circumscribed osteomyelitis of the radius. Glanders bacilli were cultured from the pus of this abscess. The experiments on animals made by French veterinarians explain the occurrence. If Nocard¹⁶ mixed with the feed and drink of horses small amounts of the culture of the bacilli, he was able to inoculate the animal so that chronic forms occurred with localized lesions. In autopsies on animals with this form of the disease the characteristic nodules were found in the lungs often with deposits of lime about them.

To repeat, the extrapulmonary metastatic lesions seen by the surgeon represent the results of dissemination in an organism which has established considerable resistance. Local circumscribed foci of infection represent a late manifestation of a general infection that has been largely overcome and where, although the balance between invading parasite and invaded host is still delicate, can readily be tipped in favor of the host.

The treatment of extrapulmonary tuberculosis or for that matter, the treatment of various forms of superinfection of the lungs spoken of as adult pulmonary tuberculosis bears this out. General resistance waxes and wanes with a variety of external conditions. Thus Borrel makes the astonishing statement that fifty per cent of the Senegalese soldiers infected with tubercle bacilli on virgin soil, taken out of the army and placed under suitable conditions with rest, sunshine, proper food, etc., recovered if their treatment was begun during the first stage when they were without fever and the only evidence of the disease was the enlargement of a group of glands.

In contrast the South African Tuberculosis Commission¹⁷ investigating tuberculosis in negro workers in the gold mines found that although a large proportion of workers reacted to tuberculin they became severely infected with a form that resembled the tuberculosis seen by Borrel, except for differences in the initial lesions. Prof. Lyle Cummins, in commenting on this fact suggests that the condition under which the South African negroes live in their own community, with sunshine, fresh air, and suitable food was such that although they were inoculated, and although such inoculation was ample to protect them at home, it was not sufficient to protect them when exposed to fatigue, and work in dark warm air with repeated contacts.

The surgeon has at his disposal for treatment various measures aside from sunlight, nourishing food, rest and removal from contaminating contact. Puncture and aspiration, incision and incision with scraping, immobilization and excision, heliotherapy and x-ray seem capable of initiating healing such that a local focus no longer gives clinical evidence of its presence.

One of the most curious instances was brought out in the observation made by Spencer Wells seventy years ago. He was operating on what he supposed was an ovarian cyst. When the abdomen was opened a large amount of serous fluid escaped and scattered through the abdomen were seen massive tuberculous lesions. He closed the abdomen and to

his surprise the patient recovered and the signs of tuberculosis disappeared. I know of no more astonishing experience in the surgical treatment of infection than this inexplicable setting in of recovery in certain types of peritoneal tuberculosis after simple incision through the abdominal wall and allowing the serous exudate to escape. I have recently seen a well nourished middle aged woman twenty years after what seemed to be a hopeless massive infection of the peritoneum. The abdomen was soft, not distended and no masses were palpable.

It is probable that the irritation of the peritoneum by the operative interference, the change of temperature, the exposure to air and the temporary arrest of peristalsis that exists for some hours after a laparotomy may be sufficient to start recovery. In any event it is a startling example of slightly changed conditions in the local environment checking the growth of the bacilli and determining a favorable outcome.

It has long been known, however, that incision of a broken down tuberculous focus or the opening of a tuberculous abscess in the subcutaneous tissue is unsatisfactory and does not lead to cure. Except in small lesions the focus does not heal. For months and even years persistent fistulae exist, occasionally closing but again opening and discharging. The tuberculous lining of the abscess becomes secondarily infected by pyogenic organisms.

If the focus be in a gland or if it be small, after a time healing may occur. In other instances the infected patients slowly succumb to tuberculosis or die after prolonged suppuration from amyloid degeneration of the viscera. The tissues behave much the same as when the opening of the abscess occurs spontaneously. That infection in the lymph glands will heal spontaneously, the broken down necrotic material being finally discharged, is attested by the observation of scars on the neck. These were formerly far more common. Professor Allbutt¹⁸ writes, "In the sixties and seventies it was as common to see persons marked by the scars of scrofula as it still was to see the marks of the ravages of smallpox."

The treatment fifty years ago with poultices and iodine paint resulted, as Dr. Allbutt writes, in "a tedious illness, unwelcome disfigurement and possible dissemination." In local tuberculosis neither incision nor spontaneous opening causes satisfactory healing. With wide incision with scraping away the tuberculous granulation, more is accomplished, but the complete removal of the focus in bone or cartilage or lymph gland or a bursa shows that local deposits of tuberculous infection are not reached by the scraping instrument. The process continues much as in instances of spontaneous opening. Evidently, although the infection is limited and although there is a large degree of immunity the body is not materially aided by these mechanical measures and the same is true of repeated punctures.

Excision of a circumscribed tuberculous focus by sharp dissection, if the lesions are removed at the end of the period of dissemination, or still better when they represent residual foci with high general immunity give satisfactory results. The balance seems to turn sharply and definitely in favor of recovery. The soft parts frequently heal by primary union, or a small sinus persists which heals in a month or two. Moreover an impulse toward healing seems to be given to other lesions.

In tuberculous glands of the neck, when the disease is local and represents a focus at a stage when there is high general immunity and a destructive local lesion, the results of excision are admirable. When the large and obviously diseased glands are removed others in the chain, often smaller than a pea, probably escape removal, yet the neck heals soundly and the lesion in the other glands regresses. It has always seemed to me that the best results were obtained by the effort to remove, with as little traumatism as possible, the focus of infection, carrying the dissection if possible through sound tissues outside the focus but with the recognition that areas of surrounding infection would probably be left and in regions where a complicated and mutilating dissection might be necessary to limit the dissection to the obvious and main focus. A second operation

may be necessary later, but it has seemed to me the patient did better when extensive tuberculosis was treated in this way than when it was approached as if one were dealing with a carcinoma.

It is essential, however, to remove the main or distributing focus of infection. The extensions from this focus will frequently heal when the main focus is removed.

I have repeatedly seen a latent secondary focus in some other part of the body become active after excision. The negro with large thoracic abscess, gave a negative history except for a swelling over his malar bone which had disappeared spontaneously. When the abscess wall and sternoclavicular joint were removed although the patient continued in good health this secondary focus became active and a fluctuating mass appeared over the malar bone which was operated on four months later. A girl of thirteen was brought to me for amputation of the arm. She looked very ill. About the elbow joint and in the upper forearm were numerous pus discharging sinuses. The x-ray showed extensive destruction of the joint. A guinea pig inoculated from a fragment removed showed lesions of tuberculosis. x-ray of the skeleton showed an area in the tibia near the joint on the opposite side which suggested a second focus of infection. I refused to amputate but advised resection of the elbow-joint. The joint was resected, the soft parts finally healed and the sinus closed but the lesion in the knee became active and a third focus appeared in the wrist. In two instances I have seen this same lighting up of other foci after amputations for tuberculosis. All three of these patients notwithstanding the multiple foci, recovered. They are possibly examples of a highly developed hypersensitivity and high immunity.

One is repeatedly warned that resection and excision will be followed by dissemination and miliary tuberculosis. That miliary tuberculosis occurs in children with localized tuberculosis is generally recognized. How often does it occur after operation? Are tubercle bacilli disseminated by operations? The bacilli in a shut-in local focus are few

in number, the general immunity is considerable or the local lesion would not exist. It is unlikely that the bacilli disseminated by operations set up widespread lesions. Miliary tuberculosis results from the rupture of a tuberculous focus into the thoracic duct or into a vein. Millions of bacilli, toxins and necrotic material are distributed throughout the body. May not the operative interference activate such a local focus in a vein and cause its rupture, just as it activates the foci which can be readily appreciated? In 1905 Wittmer¹⁹ collected 763 case reports of resections and secondary amputations. In this number there were twenty-four deaths from acute miliary tuberculosis following operations. The report covered a period when very extensive and mutilating resections were considered necessary and where the unfavorable outcome often resulted in secondary amputation. Wittmer writes that he has been unable to find a single instance after the excision of tuberculous glands.

The unsuspected presence of an intima tubercle in the vascular system is one of the menaces of generalized tuberculosis. That such a focus may be activated by an operation is possible but it may also be activated by the course of disease untreated. I know of no statistics which show the relative danger.

Excellent results have been obtained on the spine, in the knee and hip by various varieties of fusion operations without excision of the focus in the bone. The elimination of motion in the diseased joints, possibly by causing the slowing of the lymph flow and by removing the irritation of the frequent disturbance of the focus of infection turn the scale in favor of the invaded organism. In a series reported by Hibbs²⁰, cure resulted in slightly over seventy per cent.

Hibbs writes, "It is interesting to find that in twenty-eight cases of tuberculosis of other joints occurring in conjunction with that of the spine, fifty-four per cent became quiescent following the spine fusion." Cure was said to take place when the fusion was solid and the general health good and there was no apparent activity of the disease.

Slightly over one per cent developed generalized tuberculosis within two months of the operation.

It is obvious then that in local tuberculosis simple immobilization not only initiates healing in the joint fused but has a beneficial effect on other foci of infection.

In local tuberculosis of the chest wall, immobilization is nearly impossible. Each breath must change the lymph flow, must disturb the cells tending to circumscribe the bacilli. The patients I have treated have all been adults. They probably present instances of thoroughly vaccinated individuals, in whom, however, during one of the fluctuations in immunity induced by intercurrent infection, fatigue, poor surroundings, etc., bacilli have again entered the circulation, and caused a local lesion.

Evidence that bacilli can live for years in calcareous lymph nodes and in old foci in bones is convincing. Bacilli obtained from old healed lesions inoculated in guinea pigs have multiplied and produced their characteristic lesions. Koenig⁷ has reported the following pertinent case. A woman had had a tuberculosis of the foot when ten years old. The lesion healed and she used the foot for sixty years. When seventy years old, after a blow, it became painful and rapidly progressive tuberculosis made amputation necessary. An old tuberculous cheesy focus was found in the tibia with a sequestrum.

In the result of blood cultures reported by Saenz¹¹, the positive cultures were, as we have said, mostly obtained in children during the early stage of dissemination but others were found in patients that showed renewed activity in an old lesion. That bacilli from time to time invade the body from without also seems evident. In one of the instances I have reported, the woman had been nursing a husband who had died of pulmonary tuberculosis.

Repeated small traumas, anatomical peculiarity, altered physiological conditions from overuse may have contributed to the deposit and local growth of bacilli. In a patient in whom the leg had been amputated for tuber-

culosis of the knee, a lesion of the chest wall had healed after excision. In two months the patient returned with a second tuberculous abscess on the opposite side of the chest. The abscess had formed directly beneath the heavy canvas strap used to hold the artificial leg in place. In a second instance I had amputated above the knee for a curious form of elephantiasis due to tuberculous infection of the lymphatic vessels. After amputation the patient used an artificial leg. When first using it he walked with a cane bearing much weight on his hand. In about a month signs appeared of tuberculosis in one of the metacarpal bones of this hand. Three of the patients I have treated were over fifty-five. Little has been written on behavior of extrapulmonary tuberculosis in old people since the paper by Sir James Paget on Senile Scrofula² in 1875. The disease is characterized by a tendency to run an indolent course with little reaction and little tendency to heal. However wide excision induced sound and permanent healing in two of the three.

Today it is not sufficient to say that tuberculosis is a general disease and that one must search for foci. There must be some attempt to appreciate the stage in the course of the disease and to realize that treatment is directed toward helping the invaded body to shut in and destroy the infecting bacilli. The surgeon never cures infection, he does something at a certain stage of infection which helps the body in an astonishing way to overcome infection and to shut in and render harmless local foci of infection. But the time must be seized when the infection is localized and the immunity high. Results are accomplished rapidly and deformity avoided by mechanical measures, whereas the natural cure might take years and results in crippling deformity. There has been, and there continues to be, a mortality of over twenty per cent, that is to say, in a very considerable number, the virulence of the implanted bacilli and the resistance of the individual and the frequency of the inoculation are such that the disease slowly progresses in spite of all the measures at our disposal.

I have purposely not used the terms primary, secondary and tertiary but they are useful terms and have come to stay.

They indicate, if understood properly, certain phases shown clinically by morbid physiology and shown anatomically by a characteristic morbid anatomy.

The first phase with limited distribution and characterized by a special anatomical picture and little allergy, can be advantageously treated by protection from contaminating contacts, by rest, by sunshine and proper nourishment.

The second phase with wide dissemination, high hypersensitivity to the tuberculo-toxins, exudative inflammation and caseation can be advantageously treated toward the end of the phase when the foci are in bones and joints by immobilization and when the focus is in other accessible structures, by excision and the general measures referred to above.

The tertiary phase, with local progressive destructive lesions and with at first, high immunity, can be treated advantageously by excision and if near a joint by immobilization by fusion combined with the general measures.

The rule that aspiration is suitable treatment for a tertiary tuberculous abscess is not tenable provided the walls of the abscess and the feeding focus can be removed.

Rules of drainage applicable to foci of pyogenic infection are not suitable for tuberculous foci and tuberculous foci with secondary infection. Excision is the treatment.

The surgeon does not eradicate tuberculosis. He helps the tuberculous patient during a certain phase of the infection to get well, often in a most satisfactory and astonishing manner.



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ANNOUNCING
THE NEW YORK ACADEMY OF MEDICINE
LECTURES TO THE LAITY
FIRST SERIES

October 3, 1935—May 14, 1936

Oct. 3, 1935	WALTER B. CANNON <i>Wisdom of the Body</i>
Nov. 14	HOWARD W. HAGGARD <i>Medicine in the Days of the Great Monarch</i>
Dec. 12	ALEXIS CARREL <i>The Mystery of Death</i>
Jan. 9, 1936	HARLOW BROOKS <i>Medicine of the American Indian</i>
Feb. 13	BENJAMIN P. WATSON <i>How We Learned About the Human Body</i>
Mar. 12	FOSTER KENNEDY <i>The Organic Background of Mind</i>
Apr. 9	ELMER V. MCCOLLUM <i>The Story of Vitamins</i>
May 14	GEORGE DRAPER <i>Man—the Common Denominator of Disease</i>

HOSACK HALL
8:15 P. M.

The Profession and the Public are invited to attend

Salmon Memorial Lectures

THE SALMON COMMITTEE FOR PSYCHIATRY
AND MENTAL HYGIENE
Announces the Publication
on AUGUST 30th, 1935 of
DESTINY AND DISEASE
IN MENTAL DISORDERS

By

Dr. C. Macfie Campbell

The first of the Salmon Lectures to appear in book form. The book is published by W. W. Norton & Company, 207 pages, price, \$2.00.



The second of the series to appear is

PSYCHIATRY

By

Dr. William A. White

which will be published the latter part of January, 1936, by W. W. Norton & Company.

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DEATHS OF FELLOWS OF THE ACADEMY

MANN, JOHN, M.D., Old Westbury, Long Island; graduated from New York University in 1884; elected a Fellow of the Academy December 2, 1897; died August 20, 1935. Dr. Mann was a member of the State and County Medical Societies, and a member of the American Medical Association. He was one of the founders of the Nassau Hospital and was one of the Charter Members of the Medical Society of Nassau.

McPHERSON, Ross, B.A., M.D., 842 Park Avenue, New York City; graduated from Harvard University (B.A.) in 1898 and graduated in medicine from Harvard Medical School in 1902; elected a Fellow of the Academy May 6, 1909; died August 17, 1935. Dr. McPherson was a member of the American Medical Association, a Fellow of the American College of Surgeons, a member of the American Society for Obstetrics, Gynecology and Abdominal Surgery, and a member of the Alumni of the Lying-In Hospital. He was Consulting Obstetrician to the Dobbs Ferry, Hackensack, Holy Name, Teaneck, and the Mather Memorial (Port Jefferson and Long Beach) Hospitals, and Professor of Gynecology and Obstetrics in the New York Polyclinic Medical School and Hospital.



BULLETIN OF THE NEW YORK ACADEMY OF MEDICINE

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THE MEDICAL MAN AND THE WITCH TOWARDS THE CLOSE OF THE SIXTEENTH CENTURY*

GREGORY ZILBOORG
New York

1.

In the Bibliothèque Nationale in Paris there is preserved under number 24122 a small manuscript written piously in the year of our Lord, 1591. This manuscript is kept in a parchment folder of a later date and bears the following inscription: "The original of the minutes [procès verbal] of the Court held to deliver a girl who was possessed by an evil spirit in Louvier, in which one will find ample proof of a person being genuinely possessed by a demon."

This manuscript was published in its original form in 1883 by the *Progrès médical* under the direction of Armand Bénet, an authority on old French documents, and B. de Moray wrote a long introduction to it.

It was written by the not too literate hand of a sixteenth century scribe, Vauguet, under the direction and supervision of the provost of Louvier, Morel, the chief magistrate of this small town in Normandie. The first entry was made on Saturday, the seventeenth of August, 1591, and the last on the fifth of September of the same year. In other words, the trial of the young girl in her early twenties, whose name was Françoise Fontaine, took almost three

Read before the Section of Historical and Cultural Medicine, January 9, 1935.

weeks and it required the constant cooperation and vigilance of the clergy, the attorney of the King, the Surgeon Baugeoys Gautier and the physician Roussel, not to mention various lieutenants, specially assigned archers, the whole population of the town, both Catholic and Protestant [*"de la nouvelle prétendue religion"*] as well as the inmates of the town prison.

The story as one is able to cull it from the meticulous descriptions of the proceedings is to us neither new nor particularly striking. Françoise Fontaine was apparently seduced by someone whom she never knew while she lived in Paris and worked as a servant. Subsequently she developed convulsions, auditory hallucinations, optic hallucinations and ideas of reference. She believed herself to be possessed by the devil and while she did cooperate, as we would put it today, with her judges and priests, she was unable to "confess," nor was she able to overcome the domination of the devil. She would have convulsive attacks in the presence of the Court as well as in Church. She stood well the consecration of the Sacraments but at the very moment when the host was offered her and she was ready to accept it, the devil broke one of the window panes over the very altar and poor Françoise fell into one of her malignant, sinful swoons. She was not delivered until the hair from her head and arm pits had been shaven by the surgeon who, himself, was very frightened and thrice begged to be excused from performing the task and had to be threatened by the provost with severe punishment in the name of His Majesty, the King. Following the removal of the hair from her arm pits, Françoise appeared to have improved so much that the Court did not deem it necessary to insist on the removal of her pubic hair. She was then turned over to the care of Curé Houdemare and Chaplain Buisson and two special male guards. She remained in the Church for six weeks, receiving Holy Communion daily. Following this she was "paroled," as it were, to the custody of a good lady by the name of Marguerite Coquette. Although still tormented by the evil spirit, she felt better, and twenty months later the lady

custodian reported to the provost that Françoise was fully delivered from the devil. However, the conscientious official of His Majesty, much in the manner of a modern psychiatrist, kept a distant watch on her and also a follow-up record, as it were; he relates what her occupations were, he records the names of her employers in their chronological order, and so forth, until he finally was convinced that a good job was duly done. The concluding sentence of the record reads: "And after the said Françoise finally left these parts, a priest of the said town of Louvier told us that the above named Françoise had confessed to him that the said evil spirit called himself Barabas and that this was the name he gave as his to the above named Françoise; this she confessed to the above stated priest who came and duly informed us of the fact." The last installment of the report is signed by "L. Morel, Bellet, M. Pelet, Vauquet, Jehan Buysson, priest, and J. Vymont," i.e. the provost himself, the scribe, the priest and other attachés. There is no signature of a physician.

As has been said before, the story presents no striking features. It merely adds another case to a mass of hundreds of thousands, if not millions, of similar cases which were observed in those days, and which some Italian psychiatrists of the nineteenth century skilfully dubbed as hystero-demonopathies. However, the manuscript is interesting for its genuineness and for the local color it offers. Its homely, naively crude and not less naively frank narrative relates how the candles were blown out in the midst of the court session supposedly by the devil and how the assisting priest pulled out a dagger ready to attack the assaulting devil. It tells us how one night in the town prison Françoise developed a severe excitement, later threw herself head foremost into the well, was caught by some obstacle half way down and remained suspended. The poor magistrate of Louvier was much concerned and not less frightened. The peaceful inmates of the prison calmly left the prison and went to report to the provost; they appeared to have been the only ones who were not very frightened, and thus in the small hours of the morning the trembling

magistrate marched to the prison under the protective guard of his own prisoners who received a generous reward of wine and money for their good deed.

It would be idle, of course, to try to subject to modern scrutiny the symptoms of Françoise Fontaine in order to prove the obvious fact that she was a mentally sick girl. It is far more interesting to try to establish what the attitude of the medical man in such cases was and why his attitude was what it was. There exists somewhat of a tradition among the historians of the Middle Ages and the Renaissance, a very unscientific tradition, which disposes of the problem quite simply: It states that those were centuries of dark ignorance and of cruel domination by a superstitious church. A century that gave us scientists such as Tycho Brahe, Regio Montanus, Telesius, Erasmus, Melanchton, Vives, Cornelius Agrippa, Cardanus, Nicolas Cusanus, etc., could hardly be thought of as ignorant and the names mentioned did not belong to atheists but were borne by devoutly religious men both Catholic [Vives, Telesius] and Protestant [Melanchton.] On the other hand, one can hardly speak of the medical profession of the sixteenth century as one of ignorance as it was this century that gave us such anatomists as Vesalius, Fallopio [died in 1562], and Eustachius [died in 1574], and also Servetus, the discoverer of the pulmonary circulation [died in 1553]. The sixteenth century also gave us such clinicians as Girolamo Fracastorius [infectious disease and syphilis]; Jean Fernel; Felix Plater; Paracelsus; the father of modern surgery, Ambroise Paré; the great plastic surgeon from Bologna, Gaspare Tagliacozzo; and last but not least, Francis Bacon whose influence on medical thought must not be overlooked anymore than the searching and penetrating irony of Montaigne. This very brief list of names alone should convince us that the sixteenth century had quite thoroughly assimilated the knowledge of the Greco-Roman past, and proceeded with a great deal of searching curiosity to develop a serious scientific foundation for the future. It was therefore by no means ignorant nor was it lacking—considering its scientific resources—in that scepticism and

critical spirit without which scientific work is impossible. It did look for facts; it did try to master facts and it was slowly learning to respect facts. In one respect, however, it lagged behind, and it continued to lag for at least another three centuries, apparently unable to cast off the fetters of tradition: it was as yet unprepared even to begin to develop a sound medical psychology. As was pointed out with some detail elsewhere¹, there were many factors that interfered with clear vision, and it is both too vague and unsound to attribute to the tradition of the Church the cause of the general obscurantist attitude towards the problems of the human mind. That the Church was the chief bearer of the tradition that believed superstitiously in the devil, sorcerers, witches, and their satellites, there is no doubt; but there is also no less doubt that this tradition was rather borne by than inspired by the Church, who neither created it nor abolished it. We deal here apparently with a tradition that is deeply rooted in man's own psychology from the dawn of his life on earth, and we are not entirely free from it even today. While today we laugh at ourselves, so to speak, when we knock on wood, avoid a black cat on the road, dislike Friday, the thirteenth, etc., we do nevertheless still knock on wood, avoid a black cat, fear a broken mirror, and dislike being the thirteenth. Moreover, who knows how many of us, if only courage did not fail, would not openly follow the very learned Rev. Montague Summers. As recently as 1927 he openly subscribed to the principles outlined in the textbook of the Inquisition, "The Witch's Hammer," and he not only equates heresy and witchcraft, but actually still believes that witches and sorcerers were incontestable realities and that they were a well organized international unit bent on destroying civilization, a dark fraternity just as the Third International, the Anarchists, the Nihilists, and the Bolsheviks².

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1. Zilboorg, Gregory: The Dark Ages of Psychiatric History. *Journal of Nervous and Mental Disease*, Vol. 74, No. 5, November, 1931.
 2. Summers, Rev. Montague: Introduction to his translation of the *Malleus Maleficarum*, John Rodker, London, 1928.

While, as we said, the sixteenth century was apparently as yet unprepared even to make a clear step in the direction of sound medical psychology, there was no dearth of clinical material. The medical literature of the nineteenth century collected a number of data and subjected them to such careful clinical scrutiny that no doubt is left in our mind that the millions of witches, sorcerers, possessed and obsessed, were an enormous mass of severe neurotics, psychotics, and considerably deteriorated organic deliria. In the two volumes of Calmeil³ alone, one can find a valuable collection of such material and the comparative study of B. de Moray⁴ would suffice as convincing illustrative material. At times one is almost loath to admit to one's self the indisputable fact that for many years the world looked like a veritable insane asylum without a mental hospital, or almost without one, or as Binz put it, it was a time when persecutory mania was endemic⁵. A word or two of an illustrative nature as to the wealth of the psychiatric clinical material: Boguet, a Judge in Burgundy in the days of Henry IV, made the following speech at the dedication of the Abbé d'Accey, a speech which was subsequently printed: "I believe that the sorcerers could form an army equal to that of Xerxes who had one million eight hundred thousand men. Trois-Echelles, one of those acquainted most with the craft of the sorcerers, states that under King Charles IX, France alone had three hundred thousand sorcerers [some read it as thirty thousand]. This being the case what should we estimate the total number to be if we include other countries and regions of the world? And are we not justified in believing that since those days the number has increased at least by half? As to myself, I have no doubts, since a mere glance at our neighbors will convince us that the land is infested with this unfortunate and damnable vermin. Germany cannot do anything else but raise fires against them; Switzerland is compelled to do likewise thus depopulating many of its

3. Calmeil, L-F.: *De la Folie*. Two vols. Paris, 1845.

4. de Moray, B.: Introduction to the manuscript referred to above. Paris, 1883.

5. Binz, C.: *Doctor Johann Weyer*. Berlin, Ed. 2, 1896.

villages; Lorraine reveals to a visitor thousands and thousands of poles to which the sorcerers are tied; and as to ourselves, who are not exempt from this trouble any more than others are, we are witnessing a number of executions in various parts of the land. Now to return to our neighbors, Savoie is not yet emptied since she sends us daily an infinite number of people who are possessed by devils, who when conjured up tell us that they were put into the bodies of those poor people by sorcerers. Adding to this the fact that the principal ones whom we have burned here in Burgundy came originally from there, what judgment could we form of France? It is difficult to believe that she will ever be purged, given the great number that she had in the days of Trois-Echelles, let alone other more outlying regions. No, no, the sorcerers reach everywhere by the thousands; they multiply on this earth like caterpillars in our gardens. . . . I want them to know that if the results would correspond with my wishes, the earth would be quickly purged because I wish they could all be united in one body so that they all could be burned on one fire⁶." This inflammatory but very sincere speech voiced a belief and a desire common to millions. This fiery and panicky state of the majority of people generated more and more evil spirits so that towards the latter part of the sixteenth century the enlightened Johann Weyer compiled from books and observations the total number of demons and evil spirits which he estimated to be seven million four hundred and five thousand nine hundred and twenty-six [7,405,926] who were commanded over by seventy-two [72] Princes of Darkness⁷. A possessed individual was not necessarily possessed by one single spirit; several and many could enter one human body. Thus it was reported that St. Fortunatus cured a man who was possessed by six thousand six hundred and seventy evil spirits⁸. Without going into any of the intricacies of the theoretical superstructure which supported the convictions

6. Quoted by Calmeil. Op. cit. Vol. 1, pp. 216-217.

7. The French reproduction of the 1579 edition of Weyer was used: Wier, Jean: *Histoire, disputes, et discours*. Two vols. Paris, 1885.

8. de Moray, B.: Loc. cit. LIX.

that we are dealing with, it can be stated that as a rule, if not always, the method used by the devil to enter the human body was that of sexual congress. This was a fact which a cardinal once stated one should be impudent to disbelieve: *idque negari non posse absque impudentia*⁹.

What was the attitude of the learned men of the day who dared to doubt these fantastic assumptions? At first, particularly in the fifteenth century, they became interested in those things which were as distant from theology as possible, they treated these flagrant but unapproachable problems with the "eloquence of silence"¹⁰." Speaking about Telesius a historian summarizes the method as follows: "Thus in man there are two kinds of spirits, two distinct agencies, not merely a soul united with matter, but material spirits and something of higher nature. The latter can be ignored while we consider the corporeal life of man and so drops out of all consideration. This was the standard method of avoiding the theological part of the doctrine of man"¹¹." This is the reason why Daremberg felt justified in saying that the fifteenth century was both active and sterile; it was both a summary and a preface. It was active because people were very busy unearthing, translating, reading, and studying the rediscovered ancient texts but they failed to do much thinking of their own; thus it was a summary of the past and a preface to the great advances made in the sixteenth century. It was not until the end of the sixteenth century, however, that the actual text of scientific doubt, to which the previous century was a preface, began to be written. The cautious silence of Telesius stands out in striking contrast with Montaigne's incisive laughter: "Through presumptions they make laws for nature and marvel at the way nature ignores those laws." In this connection Rabelais cannot, of course, be forgotten.

9. *Multis experimentis compertum est, interdum mulieribus improbes esse demones, earumque concubitum expetere et peragere, idque negari non posse absque impudentia.* de Moray. Loc. cit. LXIX.

10. The expression is Brett's. Cf. Brett, George: *History of Psychology*. Vol. I., p. 160. London, 1921.

11. *Ibid.* p. 146.

In the meantime the whole field of clinical psychiatry was covered by theologians and their psychiatric practice seemed to emanate almost exclusively from the twenty-seventh verse of the twentieth chapter of Leviticus which reads: "A man, also a woman, that has a familiar spirit or that is a wizard shall surely be put to death; they shall stone them with stones; their blood shall be upon them."

2.

If we return now to the story of Françoise Fontaine, we shall find that even a cursory perusal of the text will impress us with the earnestness and honesty of those who were in charge of the trial. They were at times frightened, at times angered, but on the whole they treated Françoise with consideration, and they were eager to give her the full benefit of the doubt. We thus find that "Because we heard it said that in order to prevent a sorcerer from doing evil, it was necessary to obtain a new broom made of birch-wood and to beat with it the said sorcerer, and fearing lest the above said Françoise be a sorceress, since we saw what she was doing was something supernatural and beyond human ken, we demanded that a new broom be produced and this was brought to us from the jail; we beat the said Françoise with this broom and hit her on the body several times doing which, however, we used up the broom before the said Françoise came to¹²." The girl failed to recover from this procedure. We may add parenthetically that the contemporary theory of stupors was that stupors and stupor-like states were due to the fact that a dumb or deaf and dumb evil spirit had entered the person. A stuporous state would not even exempt one from the accusation that the afflicted one attended the witch's Sabbath in spirit while her body lay as if dead in bed. However it may be, Françoise was brought to for a few minutes; she was able to make five or six steps to enter the courtroom. At that moment the doctor and the surgeon, named Roussel and Gautier respectively, made their entry and they were informed of what happened heretofore. All this occurred on August 31, 1591, i.e. four-

12. *Procès Verbal*, etc., pp. 28-29.

teen days after the opening of the trial. As we see, a medical opinion was not considered a very urgent matter although it was not cast off as unnecessary altogether. In the meantime Françoise fell to the floor; she had another or re-entered her first spell. The doctor and the surgeon "saw that the neck of the said Françoise was quite swollen and she threw herself here and there; they were as astonished as we were and the said Roussel [the physician] stated that he was in possession of the root of a certain herb the name of which he gave us but which we have forgotten, and he said that if he put it in the mouth of the said Françoise he would be able to say whether it was a sickness or an evil spirit that possessed her. We at once dragged the body of the said Françoise, she remaining on her back, along the said courtroom—which procedure was observed by the said Roussel, the doctor, who according to his own statement belonged to the new alleged religion; he then stated that the said Françoise was possessed by an evil spirit and that it was beyond his power to prescribe anything for her." Françoise, in the meantime, continued to "lie on the floor face upward, arms extended like a cross, squirming in all directions¹³."

From this moment on the procedure turned into the direction of traditional exorcisms and other authorized ecclesiastic methods of casting out the devil. One might be inclined to consider as atypical the behavior of the small town physician, Roussel, and wonder what the views of those of his colleagues were who had the benefit of large cities and great centers of learning, but this assumption cannot be entirely borne out by facts. All traditions die hard and the medical tradition of keeping away from the devil's tricks died perhaps the hardest. Even the anatomical discoveries of Vesalius which could be so easily demonstrated on the cadaver did not at first appear convincing to his contemporaries. They were more ready to assume that the discrepancies between Galen and Vesalius were due to the fact that humanity had degenerated since the days of Galen,

13. Ibid. p. 30.

than to admit that the great physician of Pergamos was wrong. As a matter of fact, the teacher of Vesalius himself, Jacques Dubois, thought that Vesalius was "crazy"¹⁴. Moreover, authoritative public opinion could not help but exert its pressure on the medical profession in a manner both effective and deadening.

We must not forget that even the enlightened humanist Melanchton sent a congratulatory letter to Calvin soon after learning that Servetus had been duly burned at the stake. The medical profession on the whole was unable until the very end of the century even to surmise that some day it might want to have, and even be called upon to do something with, the host of alleged possessed, sorcerers, demonomaniacs, etc. We may well omit the consideration of the great lay authorities on the devil and his deviltries. Such keen and ingenious minds as Jean Bodin, for instance, devoted their lifetime to the study of what Montaigne called "presumptions through which they made laws of nature." They were great legal and theological authorities whose task and historical function it was, through the very nature of their task, to preserve and not to let go, to codify and not to rescind, to justify the belief rather than to test it. As to the medical clinician, while he began to look askance at the phenomenon of demonomania, he at first did not even dare to wonder. Thus John Lange [1485-1565], one of the most distinguished physicians of his day states in his *Medicinalium epistolarum miscelanea* published in 1554¹⁵: "Ulrich Neussesser, a peasant in Tugenstal, killed himself in 1539 with a sharp tool. A few days before his death an enormous nail was extracted from Ulrich's abdomen by means of an incision into the skin where it was protruding. Those who performed an autopsy following the felony [suicide], removed from the stomach an enormous piece of wood, four knives, two pieces of iron, and a bunch of hair. All these objects, they stated, had been deposited there by some diabolical trick." Lange did not hesitate to cite this as

14. Diepgen, Paul: *Geschichte der Medizin*. Vol. III. p. 14.

15. Quoted from Calmeil. Op. cit. Vol. I, p. 174.

an illustration confirming the existence of supernatural diseases; he also quotes the example of a woman who vomited out two iron nails, two needles, and a bunch of hair¹⁶.

Lange was not an exception, of course. Ambroise Paré, the younger contemporary of Lange, specifically stated in his medical writings that the devil can assume any guise he pleases from serpent to raven, cat or dog; he could turn over pages in the dark, count money, throw things about the room at night, etc. Once when attending Court he observed Charles IX laugh heartily at the tricks shown by a magician. The illustrious surgeon bent over and whispered into His Majesty's ear: "Thou shalt not suffer a witch to live." In his clinical observations, Paré apparently considered the work of the devil one of the points to be considered when a differential diagnostic problem would come up. He thus reported the following: "A young nobleman would have convulsions from time to time which would involve now and then different parts of his body such as the left arm, or the right, or on occasion only a single finger, one loin or both, or his spine, and then his whole body would become suddenly so convulsed and disturbed that four servants would have difficulty keeping him in bed. His brain, however, was in no way agitated or tormented, his speech was free, his mind was not confused and his sensations, particularly those of the convulsions, remained intact. He was tortured by these convulsions at least twice a day and would come out of them all tired out and broken for they caused him a great deal of torment. Any well-advised physician would have said that we were dealing with a case of genuine epilepsy, were it not for the fact that his senses and his mind remained unaffected throughout the attacks. All

16. The veracity and oddity of what might be called "pathological swallowers" was not confined to the sixteenth century; there is a collection of very striking radiographs at Bloomingdale Hospital which discloses the swallowing propensities of some patients with depression and schizophrenia who even for a long time before they reach the hospital successfully practiced the incorporation of numberless hairpins, teaspoons, thermometers, etc. However, while this symptom still persists in the twentieth century, demonomania, like chlorosis or sweating sickness, has all but disappeared.

the good physicians who were consulted came to the conclusion that we were dealing here with a convulsion which was the nearest approach to that of epilepsy and that these convulsions must have been provoked by a malignant vapor lodged within the spinal cord from which the said vapor expanded into the nerves that originate within the spinal cord only and thus failed to affect the brain itself. The cause of the malady was thus established by this judgment and no measure that the art had at its disposal was forgotten in order to relieve the poor patient of his trouble; yet all our efforts remained of no avail since we were miles and miles away from the real cause of the trouble.

"For, at the end of the third month it was discovered that it was the devil who was the cause of the malady. This was learned through a statement made by the devil himself, speaking through the lips of the patient in profuse Latin and Greek. The devil would always discover the secret intentions of those who attended to the patient's needs and particularly the plans of the physicians. He stated with mockery that despite the great dangers to his own safety he succeeded in circumventing all medical procedures. With the physicians thus rendered useless, the patient had almost died. Each time and always, whenever the father of the patient would come to visit him, the devil would become impatient as soon as he saw him at a distance and would shout: 'Make him go back; don't let him come in,' or 'Take the chain off his collar.' The father of the patient was a noble knight and in accordance with the customs of French Knights he wore a collar of his order from which a chain was dangling with the image of Saint Michael. The patient would become restless whenever one attempted to read something from the Holy Scriptures to him. He would try to get up and thus would be even more tormented. The paroxysms over, the poor, sick man would recall everything he had done or said and he would repent, saying that he had said and done all these things against his own will.

"This devil, forced to talk frankly by means of religious services and exorcisms, stated that he was a spirit and he was not at all to be damned for any forfeit whatsoever. He

was then interrogated as to what kind of a spirit he was and by what means and by virtue of what authority he tormented the young nobleman, and he replied that he had many residences where he hid himself and that during the time when he let our patient rest for a while, he would move about tormenting other people. He also stated that he was relegated to the body of our patient by some one whose name he did not want to give, that he entered it through the patient's feet and went up to the level of the brain and that he would leave the patient also through the latter's feet, but not until the day set by previous agreement had arrived. Following the custom of other servants of the devil, he talked about many other things. I want to assure you that I am not reporting all this merely to play it up as something new, but in order to make people recognize that the devil does enter at times into our bodies and tortures us with unheard of torments. Occasionally he does not enter the body at all, but just agitates the good humors within us, or sends bad humors into the different parts of our bodies¹⁷."

Nor was Jean Fernel [1497-1558], one of the greatest clinicians of his time, free from the same bias. Fernel was a scientist and clinician of the first order and in his spare time he amused himself by calculating the size of the earth, but he followed tradition and despite the clinical evidence to the contrary, he believed in the existence of lycanthropy [werewolves] as a separate clinical entity. This "disease" was described by the later representatives of Greco-Roman medicine, particularly Celsus and Paulus Aeginatus, and in the sixteenth century books frequently exercised a greater influence on the mind of the practicing physician than clinical facts. This was the reason why Daremberg stated at the risk of provoking great astonishment that he found the medical history of the sixteenth century less attractive than that of the fifteenth. "The history of the sixteenth century," says Daremberg, "could be reduced to the following three points: the humanists busy discussing texts; anatomists scrutinizing nature; and Paracelsus

17. Paré, Ambroise: *Oeuvres*. Lyons, 1633. Quoted by Calmeil. Op. cit. pp. 176-178.

dreaming at high noon and raving delirious while in full possession of his senses¹⁸."

Before we give any details of Paracelsus' "dreams" and "deliria," we might state that the medical man of the sixteenth century, imbued as he was with the physiology of the re-discovered Greco-Roman science, could not help but remain the child of his age. Here and there physicians, great authorities on ancient medicine [Montanus, Schenk, Houllier], did describe clinical conditions similar to those of diabolic possession and did consider them physical, particularly cerebral affections, but in this they appeared more to follow the noble literary tradition of the Hippocratico-Galenic theory than to raise an effective protest against the prevailing practices. The devil and the witch as his chief servant on earth remained an entity apart from medicine and medicine openly and passively accepted the current attitude. For a long time medicine failed either to register a serious protest or to undertake a dispassionate scientific study of the phenomenon of demonolatry. That the witch was a witch no one doubted, but occasionally one heard a reference to what we might call today the physical or constitutional predisposition to being possessed by the devil; the concept being that the devil needs some weak organ in the human body in order to settle there. This, of course, was not a revolutionary idea, nor was it even new since St. Jerome, who died at the beginning of the fifth century [420], had already represented this point of view when he said that the black bile [atrabilis] was the favorite liquid in which the devil loved to bathe. Moreover, as can be noticed from the case cited by Ambroise Paré and from the writings of Fernel and Plater [1536-1614], the devil was apparently free to choose the point of entry and the organ to reside in without the prerequisite of anatomical or physiological pathology. So deeply rooted was the concept of the witch in the mind of the clinician that the closest and most conscientious observations and studies would not arouse him to the temerity of subjecting witchcraft to scientific doubt.

18. Daremberg, Charles: *Histoire des Sciences Médicales*. Paris, 1870. Vol. I, p. 355.

and the witch to clinical investigation. Thus Plater, a very conscientious and industrious doctor, had two hobbies: he collected musical instruments and kept company with the maniacs, frenetics and idiots of the town. He would not only visit the dungeons where the "insane" were kept, but actually lived with them for a time sharing their filth and misery. He was one of the first, if not the first in modern times, to attempt a scientific psychiatric nosology, and yet he came out of these strenuous and serious studies a firm believer in the devil as the causative agent of many mental conditions which we would classify today as psychoses.

It is for the future historical sociologist to find a definite scientific answer to the question as to what were the various forces that made the concept of the witch such a tenaciously cruel and almost ineradicable concept in medicine. This communication is concerned only with registering the facts that marked the evolution which medical thought underwent in the course of the sixteenth century. From what has been said thus far, one would be justified in concluding that almost up to the very close of the century medicine either shied off and away from the problem or joined hands with public opinion and the jurist in the principle of "Thou shalt not suffer a witch to live," or by way of ineffective compromise followed St. Jerome's views, thus preserving both the current increasingly scientific anatomy and physiology and the current faithful and persistent belief in witchcraft. No one seemed ready as yet to recall Canon Timothy's advice which was that if a wife be disturbed by an evil spirit, send her back to her husband and let him take her to a doctor who will treat her for her craze¹⁹.

3.

We may now return to the "delirium" of Paracelsus. The bombastic Theophrastus was a strange man and a rather disturbed and highly hectic mind, violent of word and at times disconcerting in behavior—but as violently and as disconcertingly sincere even at the height of his conceit—the real medical Don Quixote of his age. Were

19. de Moray, B.: Op. cit.

his clinical, scientific ability equal to his uncanny clinical intuition, he would have undoubtedly been the first to disturb the stagnancy of medical psychology rather early during the Renaissance. Unfortunately his greatest endowments in this field were temperament [of Paracelsus it is more correct to say temper] and intuition. His interest in mental diseases showed itself very early: he wrote his *De Morbis Amentium* in 1525 or 1526 [according to Sudhoff], i.e. when he was only thirty-one years old, although it was not published until almost forty years later, after his death²⁰. Possessions, exclaimed Paracelsus, while they are not physical diseases, are a definite type of pathological accident. Mental diseases have nothing to do with evil spirits or devils; the individuals who are mentally sick merely drank more of the "astral wine" than they can assimilate; the experienced [doctor] should not study how to exorcise the devil, but rather how to cure the insane. Some mentally sick are animals with sane minds and some are insane animals. "The insane and the sick," Paracelsus exclaims, "are our brothers; let us treat them to cure them for nobody knows whom among our friends or relatives, this misfortune may strike." In other words, Paracelsus was violently outspoken against the views of his contemporaries and preached a new psychiatry. He belonged to what Daremberg called "the turbulent minority who did not respect the Greeks any more than the Arabs." Daremberg states: "I should gladly call the chief of this faction [Paracelsus] the Luther of Medicine, if he had succeeded in something more than in augmenting the ruins of the past, i.e. if he had succeeded in founding something durable and if he himself had not said that Luther was not worthy even of unlacing his shoes²¹."

Like Luther, Paracelsus did not lack in explosiveness and tempestuousness of ideas, but like him he did lack in sufficient detachment and was not infrequently moved to be

20. The Basel German original was used for this study. It is entitled *Medici Aureoli Theophrasti Paracelsi Schreiben von den Krankheyten so die Vernunft beraubten*, etc. Basilee, 1567.

21. Daremberg, Charles. Op. cit. pp. 325-326.

rather cruel. He had no use for those mentally sick who would not easily respond to his treatment. They were to him but hopeless animals and he recommended that they be thrown into the darkness of dungeons for the rest of their days. Following his weird physico-chemical theories, he recommended that the bodies of the mentally sick be sacrificed, especially the tips of their fingers and toes, to form an outlet for the pathogenic fluids and vapors. In other words, the emotions and the theoretical concepts of Paracelsus were revolutionary and rebellious, but he lacked in disciplined thinking and hence he had no scientific method. *Mutatis mutandis*, the same might be said of Rabelais and Montaigne who, each in his own way, gave vent to their rebellious sarcasm and sardonic dissatisfaction with tradition, but who naturally were unable to test scientifically the illusions of the age which they were combatting so persistently. The real scientific battle did not begin until the last quarter of the century, and it was not won for a long time.

4.

Non-medical thought was able to fight only in the manner of Rabelais and Montaigne, i.e. with derision; more aggressive methods would have naturally led to the scaffold or the pyre. On the other hand liberal thought, humanistic and humanitarian though it was, was bookish, so to speak; though it was keen and penetrating, it could not be effective enough, for books and treatises could not be very strong mediums only a century after the discovery of the printing press. Moreover, while Europe was literally studded with pyres and scaffolds, a plain and dispassionate statement of fact was not exactly the most efficient weapon to use. That was probably why such clear thinking men as Juan Luis Vives or Levinus Lemnius left but little imprint on their generation, no matter how important their writings might be to the historian of European thought.

Vives was interested in things human and he made a very serious attempt to reorganize the care of the mentally sick in his native city, Valencia. In his intelligent concern about the psychological problems of man, he appears to have been

in more than one respect a great deal ahead of his time. He was considered by many the founder of feminine education and he became known in the history of the Renaissance primarily as an educator; yet he is hardly remembered as a psychologist, and still less mentioned as such despite the fact that in the third book of his *De Anima et Vita*, entitled *De Affectibus*, he deals apparently for the first time with human affects and he does so with unusual keenness and in a manner almost completely modern.

As to Levinus Lemnius, "he recognized that although energumens do improvise and use unknown languages, and although they do at times appear to know temporarily a tongue which they had never been taught, they possess this faculty while in a state of ecstasy that is attributable to vehement cerebral stimulation: the humors vivified by the malady exercise as strong an influence on the brain as strong wine would, or they act in the same manner as a blow which arouses sparks from a flint stone, or as a fever that arouses certain forces usually not present in the organs of our body. Spirits and demons don't have any part in the production of the phenomena mentioned and therapeutic measures remove them at times quite promptly. Epilepsy at one time was also attributed to the activity of maleficent spirits, but it is not considered any more a supernatural affection. It is in the brain and in the humors that one should look for the cause of those attacks which betray the presence of the falling disease²²."

It is quite evident from the above that in their attempt to destroy the superstitious scaffolding of the age, the essayist, the philosopher, and the physician had but little more new and convincing evidence to offer than the old writings of the Greeks; hence the argument appears to us both anachronistic and somewhat anemic no matter how correct it was, for in matters psychological the learned man of the sixteenth century had little more to fall back on than the original Hippocratic humoral theory and his views on the Sacred Disease which were expressed two thousand years

22. Calmeil. Op. cit. Vol. I, p. 189.

previously. The medical man struggled against his own deficiency; towards the close of the century he accumulated enough clinical observations to perceive a serious doubt in his mind and he was no more able to remain so glib and so garrulous on the matter as Ambroise Paré was twenty-five years before, yet he could do nothing but grope for some explanation within the limits of a truly primitive physiology and only an embryonal psychology. Nicolas Lepois can serve as a perfect illustration of this rationalistic groping. Not as great a man as his older brother whose place he took as the personal physician of Prince Charles of Lorraine, he was a great student and in 1580, the year when Montaigne first published his essays, he published a treatise on internal medicine which survived almost two hundred years, one edition—that of 1766—appearing with an introduction by Boerhaave. The problem that stood before psychological medicine which was represented by men like Lange or Paré was how to differentiate between *natural* [i.e. organic] and *supernatural* [i.e. demoniacal] affliction. As will be remembered, they saw little difficulty in the problem: if the patient would not react to a certain herb, or if he or she would suddenly begin to talk an ancient tongue, or if he or she would state themselves that they acted against their own will, or if they described their hallucinatory experiences—their affliction was not *natural*. The trend represented by Lepois was to prove by quotations or speculation that the whole field of demonopathies could be explained on the basis of *natural*, i.e. physical causes. To a large majority of the people the mentally sick person was still guilty by virtue of his sickness and it was not so much necessary for any one to prove his guilt, as for the patient to prove his innocence. This was obviously a very difficult problem. Lepois did not think that physicians could justify the belief in demonolatry. While he conceded that there existed a state of mind which might be called the delirium of inspiration that was caused, according to Plato, by the breath of Apollo and was operative in prophets, sibyls, etc., one should not in one's medical practice attribute mental

disease to the influence of spirits²³. Lepois then proceeds to describe various observations on transient, acute, and permanent states of loss of memory and attributes them all to cerebral pathology. However, he has nothing to offer in scientific corroboration of his views except sound clinical observation and great medical literary erudition. He states, therefore, that the brain may be affected directly or "by sympathy," i.e. he reiterates the old Galenic theory. He could do no more, for medicine was still awaiting the coming of Harvey, Haller, Willis, Bichat, etc.

5.

As can be easily seen from the above, the last quarter of the sixteenth century was marked by an increasingly restless doubt creeping into medical thought. It is clear that man and his humanness, the chief object of interest to the Renaissance, presented to the medical man a psychological problem which was most puzzling, most intricate and most dangerous. In this respect the sixteenth century appears to be sharply defined from its beginning to its end. It was in 1501, in the first year of the century, that Magnus Hundt published his *Nature of Man*, coining a new word *Anthropologia*, and it was toward the very close of the century that the restlessness of medical thought, preoccupied with human problems, became most marked. Thus some medical men had radically changed their whole manner of thinking within a very short span of time. Cornelius Agrippa [1486-1535] was a good case in point: he started with a mystical, astrological, and alchemical trend characteristic of the age, and gained a comparatively shady reputation of a magician or even a wizard who was well versed in this field of "sciences," as it was then called. However, towards the end of his career he published a book in which, beginning with the title itself and throughout the text, we find an unequivocal denunciation of all the occult sciences of his day and a frank declaration that they all are uncertain and vain²⁴. Agrippa was interested in mental diseases and he

23. Calmeil. Op. cit. Vol. I. pp. 211-212.

24. Henrici Cornelii Agrippae: *De incertitudine et vanitate scientiarum declamatio invectiva*. Paris. [probably 1525].

openly fought the courts for their witch hunting. Needless to say, he was looked upon as a suspicious and rather tricky character and everything about him, even his French poodle dog, was considered suspicious; as a matter of fact, they thought that the dog whose name was *Monsieur* was the devil himself, or one of his deputies, under whose guidance Agrippa lived and worked; that is why Agrippa called him politely *Monsieur*. Nor did the man escape the suspicions of his more enlightened contemporaries. We find him depicted in the manner of highly destructive caricature in Rabelais' *Pantagruel* under the name of La Trippa. Whatever may be said against Agrippa, he was a valiant man and one of the real pioneers in combatting the universal psychosis of demonological philosophy, and even if he had none of these things to his credit, his name should be gratefully preserved in the history of medicine as that of the teacher of Johann Weyer, for Weyer's is the greatest contribution to the practice of psychological medicine of the Renaissance. Weyer [Wierus, Wier] was the first to set out to investigate independently before he argued and to observe and to prove rather than to limit himself to a traditional bookish protest. He was a singular and quite fortunate combination of keen irony, such as only a Rabelais or Montaigne could boast of, with a scientific steadiness and persistent studiousness which had not been equalled by any of his medical contemporaries or predecessors. From the very outset Weyer proceeded to look upon the demoniacal world around him as an enormous clinic teaming with sick people, and he set himself to make careful clinical studies while spending his spare time in going over the whole literature on the subject and subjecting it to a critical analysis. He also traveled extensively and obtained first hand knowledge of oriental magic in Fez and Tunis. The result of it was, first of all, the conviction and the statement thereof that the "encowled," i.e. the monks, should have nothing to do with the management of the sorcerers and witches; and second, that these witches were sick people and therefore they should be treated by physicians. He is frank and open; he is also very pious and at no time does he give any sign of being an unbeliever. Despite his critical and at times quite

sarcastic attitude, he never even tends to sacrilege; he merely states that it would be wiser to let six guilty individuals go free than to put one innocent person to death, and he thinks that the monks would do better if they studied the art of healing instead of specializing in the art of killing. He quotes a series of bishops who were opposed to the practices of the Inquisition and declares himself opposed to the "incendiary bishops." "If we could put to better use the wood and piles of fagots which are now used to burn innocent people, our expenses would be considerably diminished." Weyer also states that he is one of those who "does not like to see how in order to destroy errors, people destroy human beings." However, he does not try to combat tradition with mere liberal beliefs which he would set up against current beliefs; instead he goes out of his way to test impartially every statement and every step of tradition. He even goes so far as not to deny the existence of the devil; he denies nothing but tests everything. Thus he sets himself to the laborious task of computing the actual number of devils. He makes a careful study of the suppression of menses, of persistent hymen and pseudocyesis, and thus makes a notable contribution to gynecology while depriving the witch hunter of some of his pseudo-anatomical and pseudo-physiological props. He studies the contemporary and ancient Latin, Greek, and Hebrew texts to verify the traditional references quoted by the masters of the witch-hunting epidemic. He tries to undermine the customary interpretation of the word sorcery in the Bible, and points out that the Hebrew word Kha-saph means not wizardry and magic of a supernatural type, but the art of mixing various injurious substances—poisons. He devotes himself to the study of the various magic salves that witches were purported to use to prove that it is not the devil but the chemical substance that produces at times the delirious ideas, hallucinations of hearing, sight, and touch. We find Weyer studying for this purpose the pharmacological action of atropin [belladonna] and also cannabis indica, which appears in his writings under the oriental name *hieran-luc*. Weyer tries to explain the subjective delusions of being transported through the air to the

witch's Sabbath by the influence of this drug. He does the same with reference to other drugs to explain the various anesthesias and abnormal motor reactions. Like the real scientist, he is ready to experiment on himself by tasting chicken soup which was supposed to contain some drug²⁵. In other words, Weyer refuses to accept the supernatural as the causative agent of mental disease and seeks it everywhere objectively. He finally, if not primarily, studies actual cases; thus he quotes an Italian who always before attending the witch's Sabbath would treat himself the evening before with some medicamentous suppository. "It is a devilish phantasy," he exclaims, "to believe that the witches could by their ceremonies kill off new born babies; it is also a phantasy that the witches unearth the babies who were killed by the above means and through cooking them prepare a special salve. All this is so terrifying that if I myself were eye-witness to such a thing, I would have to say that my imagination deluded me. Yet let us assume that all this is true; then the question arises, wherefrom does such a salve obtain its powerful properties to lift an individual into the air if he himself is smeared with this salve, or even the chair on which he happens to be sitting is smeared with it. And yet the 'Witch's Hammer' tells us about it." It is also a phantasy to believe that the devil can introduce a foreign body into our stomachs or any other organ. He studies this problem carefully and devotes the whole fourth book of the first volume of his *Histoire et disputes* to this question. His procedure differs from that of Lange. He relates how he himself observed a sixteen-year-old girl from whose mouth he extracted a heavy kerchief and a few other objects. Her father stated that she would frequently vomit up such objects which he was certain the devil introduced into her stomach. Weyer uses palpation of the abdomen to prove that one cannot get any tactile perception of a foreign object in the girl's stomach. He examines the kerchief and points out the absence of chylus or remnants of other food which would be present on the object had it come from the stomach, since the girl

25. Binz. Op. cit. p. 41.

had had her regular meal only a short while before. He then goes carefully into her history and traces the girl's trouble to a stomach ache which she tried to cure by drinking some sort of water she bought as Holy Water. The girl was supposed to feel better when a sign of the cross was made over her. Weyer remarks that he is not at all disrespectful of the Cross, but merely mentions the fact to show how misused it is at times and he concludes: "These are the consequences a person has to suffer from when one turns away from the natural remedies given to us by the Lord and through Him created by man, and when one turns to things which only nourish the unjustified insanity of witchcraft."

On another occasion Weyer cites another interesting personal observation of a small epidemic of demoniacal possession among the Augustinian nuns in Cologne in the Cloisters of Nazareth in 1564. They suffered from convulsions during which Weyer could not overlook the erotic nature of their motor reactions: "*praeter aliud spectaculum horribili modo frequenter editum, prosternabantur saepe numero deorsum, infima corporis parte succussata ad eum modum qui Veneri solet ascribi, oculis interim clausis. Qui postea cum pudore aperiebantur, quum velut a multo labore respirarent*"²⁶. An epidemic of typhoid fever put a temporary stop to the demoniacal outbreak, which recurred after the fever had passed. On the 25th of May, 1565, Weyer examined the cloister and the nuns and conducted an investigation. In this he was assisted by the Burgomaster, Dean Johannes Altena, a Dr. Echt, and Weyer's son, Heinrich, who himself was a doctor of philosophy and medicine. They traced the beginning of this epidemic to the misbehavior of some young nuns with a couple of young men from the neighborhood. In his written opinion Weyer wrote: "My faithful opinion is that all the nuns should be separated from each other. They should be turned over to their devout and God-fearing parents or nearest relatives, who will gladly take them with the Lord's assistance and be

26. Quoted by Binz. Op. cit.

of help to them so that their disturbed feelings under the pressure of fear and horror should not become still more disturbed, etc." As to the theory of sexual congress with the devil, Weyer subjects it to a ruthless anatomico-physiological analysis and derisively proves how untenable the assumption is. He concludes that the so-called witches imagine things that are not true. They tell untruths without knowing it and believe the untruths they tell. The experiences which they describe as actual happenings during their attacks are imaginary. In fact, the witch has never done a thing that would justify her sad fate at the hands of authorities. Time and again Weyer tries to convince the world around him that a physician should be called in in every case of demoniacal possession.

We might add, paraphrasing St. Augustine who said that in describing the attributes of God man tries to describe his own qualities, and say that in describing the attributes of Satan man described his own sinful propensities. Weyer dubbed Satan quite sarcastically *Milleartifex*.

Weyer's views were met with a great animosity. In addition fate was quite unkind to him: he was the personal physician of the Duke William von Jülich-Cleve-Berg and enjoyed his protective influence. However, the Duke himself and his son developed what appears to have been acute psychoses, and an outbreak of prosecutions of witches followed and Weyer had to flee. Jean Bodin, the cruel and talented legal authority of the day, was Weyer's most learned and violent opponent, but the seeds sown by Weyer bore fruit. In the course of the century and a half that followed Johann Weyer's writings, although they were put on the *Index Librorum Prohibitorum*, they became known all over Europe, even in Spain and also in England where Reginald Scot, following Weyer, wrote his *Discoverie of Witchcraft*, incurring thereby the wrath of King James. His Majesty caused the book to be destroyed, and in reply to it wrote his *Demonologie*. The influence of Weyer on psychological medicine should not be underestimated, particularly because he was the first to introduce the observational and the experimental method in the study of the mass

psychoses of his day, and because he studied the human being as a human being and not as a body bearing a mystical entity of demoniacal susceptibility. To him pathological behavior of man was determined by exogenous and endogenous causes, and not by the free and malicious will of the sinner that man was supposed inherently to be. In short, Weyer's task was (1) to introduce the scientific method to psychopathology and (2) to reclaim the whole field of mental pathology for medicine. As has been said, the sixteenth century did not succeed in seeing Weyer's ideas victorious, but one could sense occasionally towards the very close of the century that demonology was being captured gradually by medicine. Thus de Thou, the President of the Paris Parliament in 1598, led this assembly to revoke the order to arrest and put to death a psychotic in Angers and ordered instead that the man be temporarily committed to a hospital.

6.

In conclusion, the following should be borne in mind. The sixteenth century closed with a definite attempt to study man's behavior in a systematic scientific way. The best summary of this principle could be found in Francis Bacon's treatise on the *Advancement of Learning* which reads: "The first article on the culture of mind will regard the different natures or dispositions of men . . . so that an artificial²⁷ and accurate dissection may be made of men's minds and nature and the secret disposition of each man laid open that from a knowledge of the whole, the precepts concerning the cures²⁸ of the mind may be more rightly formed. And not only the characters of dispositions impressed by nature should be received into this treatise, but those also which are otherwise imposed upon the mind by the sex, age, country, state of health, make of body, etc. And again, those which proceed from fortune as princes, nobles, common people, the rich, the poor, the magistrates,

27. This word meant "scientific" in the XVI and XVII centuries.

28. i.e. culture.

THE DEVELOPMENT OF THE STETHOSCOPE
AN EXHIBITION

SHOWING THE WORK OF LAENNEC AND HIS SUCCESSORS
HELD IN THE LIBRARY FEBRUARY 13 TO MARCH 29, 1935

Arranged by
PAUL B. SHELDON
and
JANET DOE

This exhibition was prepared, not as an exhaustive study of the stethoscope's history, but more as a survey of the salient points in the development of the instrument. The Academy's Historical Museum possessed several early and later stethoscopes. These were supplemented by material kindly lent by friends and interested institutions. An effort was made to show illustrations, if the instruments were not available. Failing both, a description was given, if possible that by the originator.

The Bibliographical Department of the Library has been very helpful in assembling the material for exhibition and in the preparation of this account, and the Librarian made numerous interested suggestions—to both of whom we are grateful.

Laennec and the First Stethoscope

RENÉ THÉOPHILE HYACINTHE LAENNEC (1781-1826)

In 1816 Laennec, a struggling physician of thirty-five, was working hard in the wards of the Paris hospitals. Physical diagnosis as practiced today hardly existed then. Percussion was scoffed at by all but a few. Physicians were just beginning to use watches in counting the pulse. Auscultation consisted merely in listening with the naked ear against the chest wall. Little was understood of what was heard. Infrequently heart sounds were intensified by placing a short solid wooden rod between the precordium and the examiner's ear.

While examining a patient's chest Laennec wished to employ such a rod. None being at hand, he attempted to improvise one by rolling sheets of paper into a solid roll. He was not quite successful and a small air space remained in the center of the roll. This *accident* resulted in the birth of the stethoscope, for the heart sounds were conducted to his listening ear as no solid rod had ever done. Astonished at the improvement, he set about experimenting with hollow rods of various materials, eventually selecting one of wood.

During the next three years he worked patiently correlating what he noted on physical examinations with what he saw at autopsy. The result was his book: *Traité de l'Auscultation Médiate et des Maladies des Poumons et du Coeur*, published in 1819. This is said to be the most important treatise on the thoracic organs ever written. In it he placed before the medical world the first descriptions and differential diagnoses of bronchiectasis, pneumothorax, hemorrhagic pleurisy, pulmonary gangrene, infarct, emphysema, and esophagitis. Even the terms he originated endure, such as "egophony," "pectoriloquy," "sonorous and sibilant râles."

Laennec was one of the greatest teachers of tuberculosis of all times. Because of the merit of his work he was honored and recognized as a great clinician and pathologist. He worked on at his study for seven years more, to die himself of pulmonary tuberculosis at forty-five, undoubtedly the victim of his labors.

1. LAENNEC'S FIRST PRESENTATION OF HIS NEW METHOD (1818).

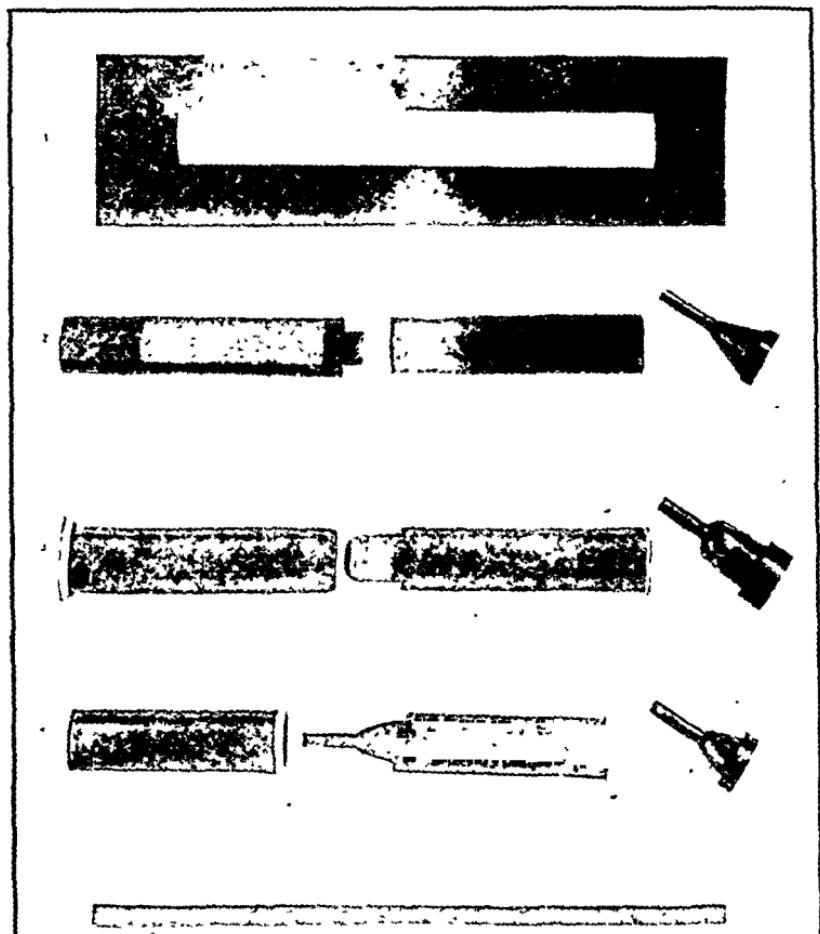
L'art d'explorer les maladies du thorax au moyen de l'auscultation.
Mém. de l'Acad. roy. d. sc. de l'Inst. de France (1818), 3: pp. ccxxi-ccxxiii, 1820.

On Feb. 28, 1818 Laennec submitted the results of his labors to the Académie des Sciences, which received them, it is said, with respect but without the slightest trace of enthusiasm. They were not published until 1820 and then only in the form of the Secretary's notes.

2. FIRST PUBLISHED ACCOUNT (1818).

Mémoire sur l'auscultation à l'aide de divers instrumens d'acoustique . . . *Bull. Fac. de méd. de Paris*, 1818, pp. 129; 156; 171.

Laennec's lecture was read before the Faculté de Médecine, May 1 and 14, June 11, and July 9, 1818. It was not printed in full but merely noted.



3. ROLL OF PAPER LIKE LAENNEC'S (Fig. 1).

Cylinder or roll of paper, 16 "lignes" (a ligne is 1/12 of an inch) in diameter and 1 foot in length, formed of 3 notebooks of "beaten" paper rolled up very tightly, held together by gummed paper, and flattened out with a file at both ends. It is related that what first attracted Laennec's attention to the use of a hollow tube for auscultation was when passing through the court of the Louvre he saw some children playing about a long beam, and one would put his ear to the end of the beam and listen while the others tapped it lightly. Described by Laennec in *De l'auscultation médiate*, 1819, 1:8-9.

4. WOODEN STETHOSCOPE LIKE LAENNEC'S FIRST MODEL (Fig. 2).

Originally brought from Paris by Dr. Henry Ingwersoll Bowditch, who studied under Louis, 1832-1834, and there imbibed the teachings of Laennec.

Presented to the Trudeau School by his son, Dr. Vincent Y. Bowditch in 1916.

Kindly loaned by the Trudeau Sanatorium.

5. FIRST EDITION OF LAENNEC'S BOOK ON AUSCULTATION (1819).

De l'auscultation médiate, ou traité du diagnostic des maladies des poumons et du cœur, fondé principalement sur ce nouveau moyen d'exploration. Paris, J. A. Brosset & J. S. Chaudé, 1819. 2 v.

This was Laennec's masterpiece. Two editions appeared during his lifetime.

6. TRANSLATION OF THE FIRST EDITION OF LAENNEC'S BOOK (1821).

A treatise on the diseases of the chest, in which they are described according to their anatomical characters and their diagnosis established on a new principle by means of acoustick instruments. Translated . . . with a preface and notes by John Forbes. London, T. & G. Underwood, 1821.

Appearing two years after the publication of the first French edition, this translation did much to introduce and popularize the stethoscope and Laennec's work in England.

Forbes became a leading consultant in tuberculosis.

7. SECOND EDITION OF LAENNEC'S BOOK ON AUSCULTATION (1826).

Traité de l'auscultation médiate et des maladies des poumons et du cœur. Paris, J. S. Chaudé, 1826. 2 v.

Garrison's comparison, taken from the third edition, 1921, of his *Introduction to the History of Medicine*, is pertinent enough to quote:

"In the first edition (1819), Laennec pursues the analytic method, giving the different signs elicited by percussion and auscultation, with the corresponding anatomic lesions (he was an expert pathologist). In the second edition (1823) [sic.], the process is turned about and the method is synthetic, each disease being described in detail in respect of diagnosis, pathology, and (most intelligent) treatment, so that this edition is, in effect, the most important treatise on diseases of the thoracic organs that was ever written."

8. TRANSLATION OF SELECTED PASSAGES FROM LAENNEC'S BOOK.

Translation of selected passages from "De l'auscultation médiate" (first edition). With a biography by William Hale-White. London, John Bale, Sons & Danielsson, 1923.

An excellent translation of Laennec's book. It also contains the story of Laennec's life with illustrations.

9. GOOD, BRIEF ARTICLES ON LAENNEC AND THE STETHOSCOPE.

Morgan, James Dudley (1862-1919).

Laennec: the great internist. *Washington M. Ann.* 9:250-258, 1910.

Lamb, Daniel Smith (1843-1929).

The stethoscope: a history. *Washington M. Ann.* 9:260-269, 1910.

Camac, Charles Nicoll Bancker (1868-).

Laennec and his stethoscope. *M. News*, 86:918-923, 1905.

10. EARLY CONTEMPORARY COMMENT (1818).

N[acquart], J. B.

Des instrumens en médecine. *J. gén. de méd.* . . . 64:135-136, 1818.

This amusing commentary was written a few months after Laennec's announcement of his discovery.

11. TWO STETHOSCOPES CONTEMPORARY WITH LAENNEC (1819?) (Fig. 3).

Stethoscopes such as Laennec used. The original cylinder model was cut in two for convenience. The pectoral end is hollowed out. The wooden plug was fitted into the pectoral end when listening for heart sounds.

12. AN EARLY MODIFICATION OF LAENNEC'S STETHOSCOPE (1820) (Fig. 4).

Haden's modification of Laennec's stethoscope. The metal tube makes for a firmer joint than in the earlier models. Charles T. Haden, a physician who worked at the lathe with Laennec, introduced the stethoscope into England.

13. LAENNEC'S MODIFICATION (Fig. 5).

Laennec, in improving his stethoscope, probably went no further than this type, a shorter, somewhat flaring, unjointed wooden tube with an ear-piece.

14. PORTRAIT OF LAENNEC.

Laennec à l'Hôpital Necker ausculte un phtisique. 1816. Mezzotint after painting (?) by T. Chartrem. Kindly loaned by Dr. J. A. Miller.

Laennec's Immediate Successors

15. PIORRY'S ADAPTATION (1828).

Piorry, Pierre Adolphe (1794-1879).

De la percussion médiate et des signes obtenus à l'aide de ce nouveau moyen d'exploration dans les maladies des organes thoraciques et abdominaux. Paris, J. S. Chaudé, 1828.

Opened at plate showing illustrations of Piorry's stethoscope with various pleximeters.

16. PIORRY'S STETHOSCOPE (1828) (Fig. 6).

A remarkably well preserved Pierry stethoscope. Photograph shows the same instrument as assembled when not in use. An extra wooden tube could be added if desired. The wooden cone was inserted into the pectoral end for cardiac examinations. The disc is a pleximeter, an invention of Pierry. This represented the first type of easily portable instrument. It was first made in 1828 and was the type most in use up to 1883. Ivory was introduced into the manufacture of stethoscopes in 1834.

17. FIRST SEMI-FLEXIBLE STETHOSCOPE (1829). 17

Comins, Nicholas P.

New stethoscope. *London M. Gaz.*, 4:427-430, 1829.

In 1829 Nicholas P. Comins of Edinburgh, in a letter to the editor of the *London Medical Gazette*, reported his invention of the first flexible stethoscope. As shown in the illustration (p. 428) it consisted of jointed wooden tubes which could be adjusted to varying angles in one plane, so that the examiner's face need not be directly over the patient's. This was often desirable because of the advanced stage of tuberculosis from which many of the patients suffered.

18. ADAPTATION OF COMINS' STETHOSCOPE (1829).

Comins, Nicholas P.

New stethoscope. *London M. Gaz.*, 4:427-430, 1829.

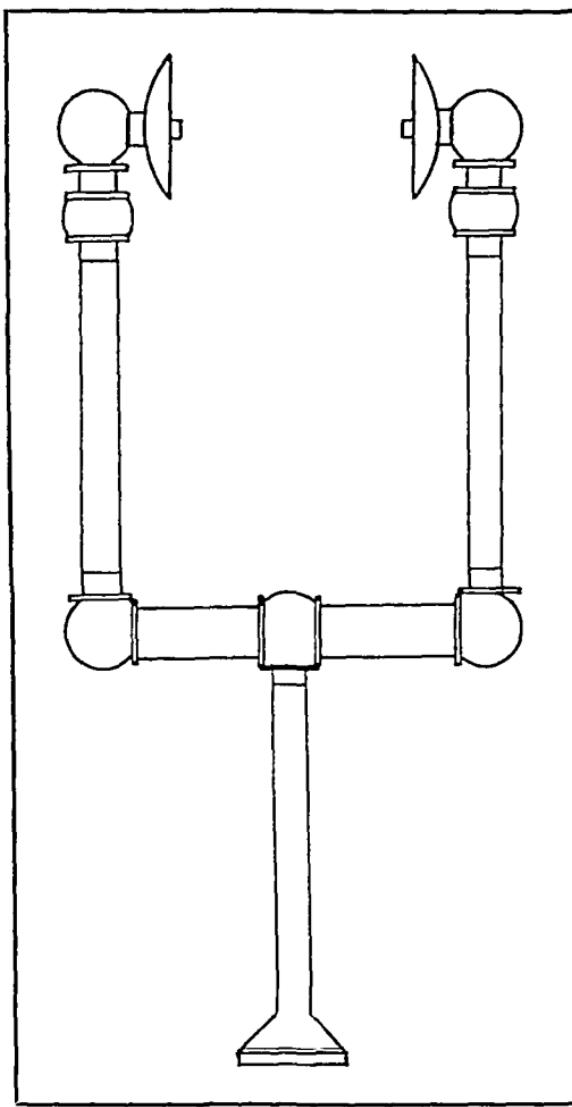
On page 430 Comins made the first published suggestion of employing both ears in auscultation, but he did not furnish a sketch of a binaural stethoscope and evidently never made such an instrument. The conjectural sketch shown is simply Comins' wooden tube stethoscope adapted for both ears. (Fig. 13a).

C. J. B. Williams, in 1843, acknowledged this idea as the father of his binaural instrument, which was also of wood.

19. DEMOUNTABLE STETHOSCOPE (before 1870) (Fig. 11).

This type, employed prior to 1870, is still used extensively in Europe. When in use, holes in side of ear-piece are covered by thumb and finger. When not in use, small end of stem passes through these holes, as shown in photograph. Easily carried in pocket. Photograph shows position when not in use.

Kindly loaned by Dr. A. R. Lamb.



13A

Conjectural Sketch of Adaptation of
Comins' Stethoscope (1829)

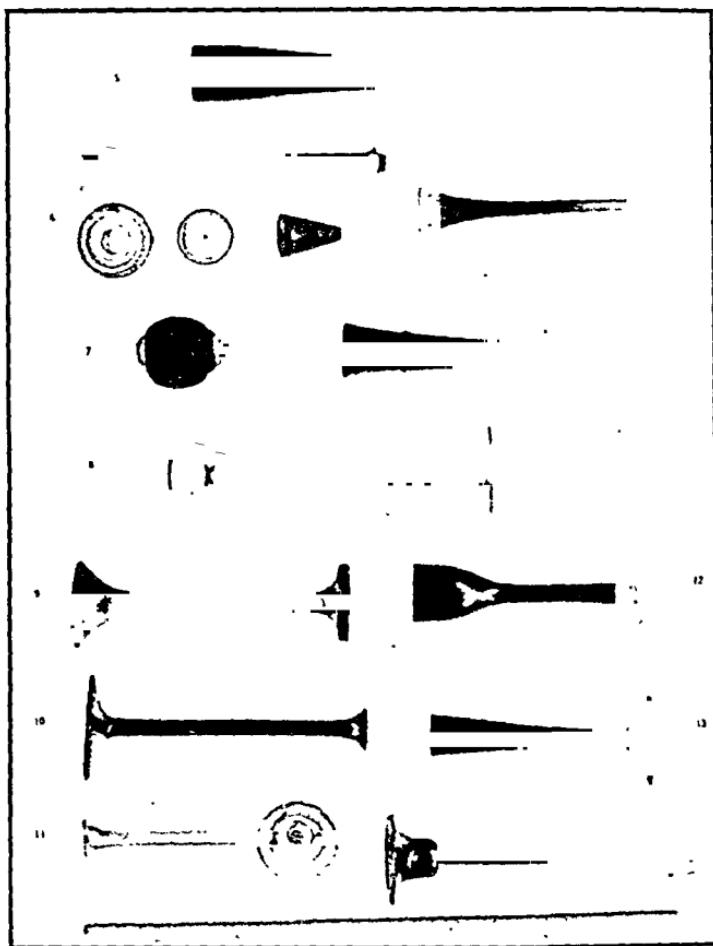
Later Development of Monaural Stethoscope

20. FLEXIBLE TUBE STETHOSCOPE (1832).

Stroud, William (1789-1858).

On mediate auscultation. *London M. Gaz.* (1841-42), n. s. 1:6-9,
1842.

Stroud, in 1832, adapted to auscultation the flexible speaking tube commonly used by deaf persons. One hand held the ebony nipple in the examiner's ear and the other held the ebony chest piece in



place. The flexible tube was made of spiral wire covered by "caoutchouc-cloth." (This easily rubberized cloth was first used about 1832; rubber tubing came much later). Stroud's instrument is shown on p. 7.

21. EXAMPLES OF STROUD'S TYPE OF FLEXIBLE STETHOSCOPE (1832) (Figs. 14 and 15).

22. FLEXIBLE TUBE STETHOSCOPE WITHOUT EAR-PIECE (1838).

Sibson, Francis (1814-1876).

The flexible stethoscope. *London M. Gaz.* (1840-41), n. s., 2:911-912, 1841.

In 1838 Sibson of Edinburgh dispensed with the ear-piece of Stroud's stethoscope. He simply pushed the small open end into his ear. He was thus able to use one hand to hold the instrument on the chest and with the other to feel the pulse. From his description he was evidently timing murmurs. His modification is illustrated on p. 912.

23. FLEXIBLE TUBE STETHOSCOPE WITH SPECIAL EAR-PIECE (1840).

Bird, Golding (1814-1854).

Observations on the advantages presented by the employment of a stethoscope with a flexible tube. *London M. Gaz.* (1840-41), n. s., 1:440-442, 1841.

Golding Bird was one of the first to use a flexible stethoscope. It was much like Stroud's save that the ear-piece was a disc cemented to the ball through which the flexible tube passed. A sketch of his instrument is shown.

24. BIGELOW'S COMPACT STETHOSCOPE (before 1846) (Fig. 7).

Henry J. Bigelow invented what was then considered a very convenient stethoscope of cedar. The wide side of the ear-piece could be placed against the chest and the stethoscope used thus as a pleximeter. The worsted ball covered with velvet has an ebony handle. It was used as a percussor.

25. EXAMPLES OF MONAURAL STETHOSCOPES (Figs. 5-13).

The ebonite stethoscope (Fig. 10) was kindly loaned by Trudeau Sanatorium.

26. EARLY AMERICAN MANUAL ON STETHOSCOPES (1846).

Bowditch, Henry Ingersoll (1808-1891).

The young stethoscopist, or the student's aid to auscultation.
N. Y., J. & H. G. Langley, 1846.

This is a most interesting manual on auscultation. It is opened at pp. 14-15, showing various types of stethoscopes: Laennec, Piorry, Bigelow.

Bowditch was a student of Louis. The stethoscope used by him is shown in another case.

27. "THE STETHOSCOPE SONG."

Holmes, Oliver Wendell (1809-1894).

Poems. Boston, Ticknor & Fields, 1856, pp. 272-277.

This characteristic poem, first published in 1849 and written either in 1847 or 1848, at the time Holmes was giving up medical practice (he became Dean of the Harvard Medical School in 1846) throws a humorous light on what may have been his own and his students' early difficulties. The doctor evidently carried one of Bigelow's stethoscopes!

28. WILLIAMS, A STUDENT OF LAENNEC.

Williams, Charles James Blasius (1805-1889).

Memoirs of life and work. London, Smith, Elder & Co., 1884.

Charles J. B. Williams was a student under Laennec at La Charité in 1825. On pp. 40-41 of his *Memoirs* he gives some reminiscences of those days.

29. OBJECTION TO FLEXIBLE STETHOSCOPE (1840).

Williams, Charles James Blasius (1805-1889).

The pathology and diagnosis of diseases of the chest. . . .

4. ed. London, John Churchill, 1840.

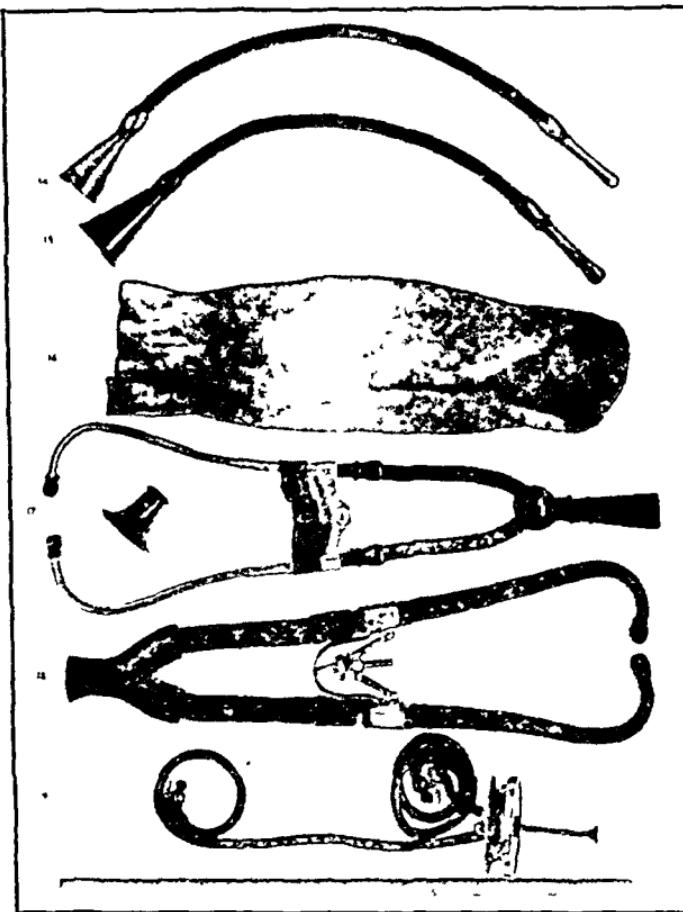
On returning to England from his studies under Laennec, Williams did much to popularize auscultation. He became an authority in his day on "consumption" and diseases of the chest. In his book on diseases of the chest, he advocates a light wooden stethoscope (shown in Plate I, frontispiece), stating his objection to the little used flexible instrument.

30. STRAIGHT WOOD STETHOSCOPE STILL IN FAVOR (1842).

Williams, Charles James Blasius (1805-1889).

On the construction and application of instruments used in auscultation. *London M. Gaz.* (1842), n. s., 1:400-404, 1843.

On p. 402 is shown another of C. J. B. Williams' light wooden stethoscopes. Fig. 3 shows a whalebone pleximeter so fashioned as to fit between ribs. Fig. 4 is a plexor, or, percussor, an instrument then frequently used to strike the pleximeter. Eventually fingers were found more satisfactory.



The Binaural Stethoscope

31. THE FIRST BINAURAL STETHOSCOPE (1843).

Williams, Charles James Blasius (1805-1889).

On the acoustic principles and construction of stethoscopes and ear trumpets. *Proc. Roy. Med. & Chir. Soc. London* (1873), 7:189-194, 1875.

In 1843 C. J. B. Williams, recalling the suggestion of Comins, made the first binaural stethoscope. It was awkward and inflexible, being made of wood and metal. So far no drawing of it has been found. Williams, at a meeting of the Royal Medical and Chirurgical Society, Oct. 28, 1873, stated that he constructed such a stethoscope "thirty years ago." (p. 193)

32. SELF-ADJUSTING STETHOSCOPE OF CAMMANN (1855).

Self-adjusting stethoscope of Dr. Cammann. *New York M. Times*, 4:140-142, 1855.

George P. Cammann of New York City did much to improve the binaural stethoscope. In 1855 he introduced the instrument here illustrated. The chest-piece was of ebony, the ear tips of ivory, and the elastic portion of the tubes of spiral wire covered by "gum elastic" and cloth.

33. EXAMPLES OF CAMMANN'S STETHOSCOPES (Figs. 16-18).

The stethoscope was carried in a chamois-skin bag or in a box. Shown ready to use: the large bell chest-piece was often held before the patient's mouth while the chest was percussed, to elicit "cracked pot" sound. Smaller chest-pieces were for ordinary auscultation.

34. "THE AMERICAN LAENNEC."

Flint, Austin (1812-1886).

Physical exploration and diagnosis of diseases affecting the respiratory organs. Phil., Blanchard & Lea, 1856.

Austin Flint was sometimes called the "American Laennec." He ranked especially high as a diagnostician in diseases of the chest and did more than anyone else to bring the binaural stethoscope into general use.

He was President of The New York Academy of Medicine, 1873-1875.

His text-book is opened to the chapter on *Auscultation*.

35. STETHOSCOPE USED BY AUSTIN FLINT.

Presented to Frederic S. Dennis by Mrs. Austin Flint and given by Dr. Dennis to The New York Academy of Medicine.

36. DIFFERENTIAL STETHOSCOPE (1859).

Alison, Somerville Scott (1813-1877).

On certain auditory phenomena. *Roy. Inst. Great Britain. Notices of proc.* 8:63-70, 1859.

The instrument shown on p. 64 was devised by Scott Alison, to compare intensity of sound coming from two areas of the chest. It was not found subsequently to be of much value.

37. DOUBLE-BELL STETHOSCOPE (1860?).

Lyons, Robert Spencer Dyer (1826-1886).

On a double-bell stethoscope, *Dublin Quart. J. Med.*, 33:364-366, 1862.

Another stethoscope (illustrated on p. 365) for the comparison of relative intensity of sounds. This had two chest-pieces and a single ear-piece. The arms of gutta percha were slightly flexible. Both chest-pieces were to be used at the same time. It was another of the variations which proved of little value.

38. FIRST DIAPHRAGM STETHOSCOPE (1869).

Stern, Samuel (1839-1915).

Zur Theorie der Auskultation und Perkussion. *Wien. med. Presse*, 10:778-782; 802-803, 1869.

Samuel Stern's instrument consisted of a hollow conical tube, across the larger end of which was stretched a membranous diaphragm. The ear tubes opened separately into the hollow tube.

39. ECHOSCOPE (1871).

Speir, Samuel Fleet (1838-1895).

Aids for the diagnosis and treatment of certain diseases. *M. Rec.*, 6:174-175, 1871-2.

A stethoscope which could be held in place by pushing the examiner's chin against the rest marked by the arrow. Thus the examiner could use both hands in percussion. It was used during a wave of auscultatory percussion of aneurysms, effusions, tumors, etc. Description and illustration on p. 175.

40. EARLY DIAPHRAGM MODIFICATION (1876).

Yeates,

New form of stethoscope. *M. Press & Circ.*, n. s., 22:58, 1876.

Air forced in stopcock expanded two parallel sheet-rubber drum heads. Several students might listen at the same time by adding the necessary elastic tubes.

41. PAUL'S STETHOSCOPE WITH RUBBER BULB (1881).

Hudson, Erasmus Darwin, Jr. (1843-1887).

A manual of the physical diagnosis of thoracic diseases. N. Y., William Wood & Co., 1887.

Another effort to combine percussion and auscultation in one act resulted in the invention of this stethoscope by Constantin Paul (1881). The chest-piece was made to adhere to the patient's skin by a vacuum, leaving both of the examiner's hands free for percussion. Book opened at p. 70, showing illustration.

42. CALIPER-STETHOSCOPE (1881).

An addition to the binaural stethoscope. *London M. Rec.* 9:219, 1881.

Invented by Irwin Palmer, this ordinary binaural stethoscope was also used as a pair of calipers. The elastic band is replaced by a circular box-spring; a dial plate is attached to the joint. It was apparently first described in the above article.

43. A VERSATILE STETHOSCOPE! (1884).

Smith, Ebenezer Thomas Aydon.

A new form of stethoscope. *Brit. M. J., 1:909-910, 1884.*

Its promoter admits that its main function is to promote hearing, but in case of necessity, by simply rearranging its parts, one can use it as a monaural, a binaural, or a differential stethoscope, an otoscope, a nasal tube with funnel for feeding the very ill, a nasal douche tube, a catheter, an enema tube, or a tourniquet.

44. HARD RUBBER BINAURAL STETHOSCOPE (1885).

Denison, Charles (1845-1909).

An improved binaural stethoscope. *M. Rec., 27:391, 1885.*

Denison substituted hard rubber for the metal customarily used in the arms of the instrument. As shown in the illustration, the sound canal diminishes in diameter as it progresses from the bell-shaped chest-piece to the ear-piece.

45. DENISON'S HARD RUBBER BINAURAL STETHOSCOPE (1885).

Kindly loaned by Trudeau Sanatorium.

46. PICKERING'S "PANARKES" STETHOSCOPE (1887).

Pickering's "Panarkes" stethoscope. *Brit. M. J., 2:1342, 1887.*

This illustrates some modifications of a single stethoscope. When used as in Fig. 1 it was manual and could be carried by internes in a button hole. As Fig. 2 it had the large ear-piece preferred by some. Fig. 3 was bimanual with flexible tubes. Fig. 4 was manual with flexible tubes. Fig. 5 shows the stethoscope serving as a handle for a percussion hammer, the ear-piece in Fig. 2 serving as the pleximeter.

47. COMBINATION MONAURAL AND BINAURAL STETHOSCOPE (1887).

Batten, Rayner Winterbotham (1835-1909).

Binaural stethoscope. *Brit. M. J., 2:1342, 1887.*

48. MODIFICATION OF CAMMANN'S STETHOSCOPE (1885).

Cammann, Donald Muhlenberg (1852-).

A modification of Cammann's binaural stethoscope. *New York M. J., 41:27-28, 1885.*

A modification by Cammann of Constantin Paul's idea, in which the rubber bulb was built around the chest-piece of the stethoscope. The stethoscope was thus held by a vacuum against the chest wall.

49. CONSTANT EAR-PRESSURE STETHOSCOPE (1891).

Herschell, George Arich (1856-).

An improved binaural stethoscope. *Lancet*, 1:609, 1891.

The ear-pieces of Herschell's instrument exerted a constant pressure of the proper intensity. He substituted a clamp for the elastic loop usually used to join the auditory tubes.

50. GERMAN SILVER AND HARD RUBBER STETHOSCOPE (1895).

Knapp, Mark Israel (1868-1920).

A new and improved stethoscope. *M. Rec.*, 48:682-683, 1895.

By covering German silver tubes with soft rubber tubing, Knapp was able to eliminate certain extraneous sounds.

51. PHONENDOSCOPE (1894).

Bianchi, Aurelio.

Il fonendoscopio. *Policlin. (sez. med.)*, 1:179-180, 1894.

Bianchi's own account of his phonendoscope, with illustrations.

52. EXAMPLE OF PHONENDOSCOPE (Fig. 19).**53. PHONENDOSCOPE (1896).**

Manges, Morris (1865-).

The phonendoscope. *New York M. J.*, 65:42-45, 1897.

Read before The New York Academy of Medicine, Oct. 20, 1896.

Opened to show the instrument in use.

Baruch, Herman Benjamin.

The phonendoscope. *M. Rec.*, 50:624-626, 1896.

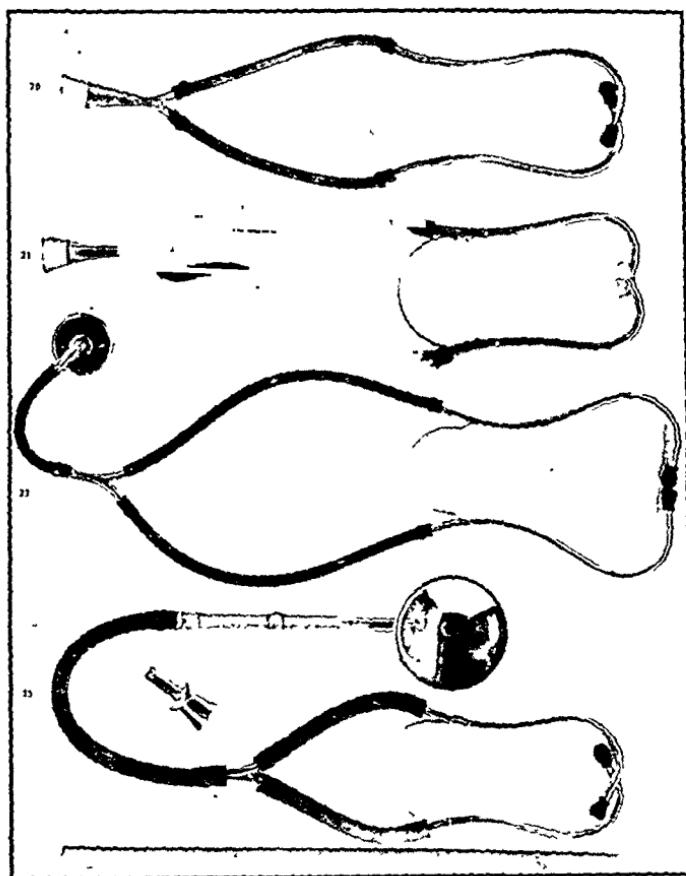
The phonendoscope, well described in this article, is a diaphragm which magnifies the usual sound. It was intended as an improvement on the usual types of stethoscope. Its advocates hoped that it would prove a great aid in outlining organs. The chest-piece was held over the organ or tumor examined, while a finger was drawn over the skin with a gentle stroking motion. As the finger approached the very edge of the organ or tumor, the sound changed its intensity strikingly. The procedure is little used today.

54. NEW STETHOSCOPE WITH ARMAMENTARIUM (1898).

Knopf, Sigurd Adolphus (1857-).

A new binaural stethoscope with armamentarium for complete physical examination. *J. A. M. A.*, 30:27-28, 1898.

In 1898 S. A. Knopf of The New York Academy of Medicine was advocating the use of such a set. The adjustable ear-pieces, various sizes and shapes of chest-pieces, including one held to the chest wall by suction, a Flint percussion hammer, and a pleximeter are shown in the illustration.



55. COMBINATION SINGLE OR DIFFERENTIAL STETHOSCOPE (1903).

Wetherill, Henry Emerson (1871-).

An improved form of stethoscope. *Am. J. M. Sc.*, 126:884-887, 1903.

A rather recent return to previous features in stethoscopic construction. This stethoscope (shown on p. 884) has separate chestpieces which can be combined as one or used individually as a differential stethoscope. The flexible projections from each tube, stroked or tapped by the finger, were used in auscultatory percussion. Diaphragms could be slipped into the bells if wished.

56. TRUDEAU'S OWN STETHOSCOPE (Fig. 20).

Kindly loaned by Trudeau Sanatorium.

57. SIR WILLIAM OSLER'S STETHOSCOPE (Fig. 21).

Used until his death in 1919. Given by Lady Osler to the Academy's Librarian and kindly loaned by him for the exhibition.

*Modern Stethoscopes***58. SIMPLE DIAPHRAGM TYPE OF STETHOSCOPE MUCH USED TODAY (1901).**

Invented by R. C. M. Bowles, of Massachusetts.
Kindly loaned by Fred Haslam and Company.

59. DOUGLASS STETHOSCOPE (1910) (Fig. 22).

Devised by Alfred A. Douglass. It is an improvement on the Bowles stethoscope and is more sensitive.

60. FETAL HEART STETHOSCOPE, "LEFFSCOPE" (1927) (Fig. 23).

Leff, Morris (1889-).

A stethoscope for auscultating the fetal heart. *Am. J. Obst. & Gynec.*, 20:108-109, 1930.

Designed by Morris Leff. The weight of the bell (2 lbs.) ensures even contact and permits free use of the hands. A regular bell may also be used for ordinary work. Kindly presented to the Academy's Historical Museum by Dr. Leff.

*Electrical Stethoscopes***61. EARLY WORK WITH ELECTRICAL STETHOSCOPE (1907).**

Einthoven, Willem (1860-1927).

Die Registrirung der menschlichen Herztonen mittels des Saitengalvanometers. *Pflüger's Arch. f. d. ges. Physiol.*, 117:461-472, 1907.

The earliest important work was done by Einthoven. He made records of normal heart sounds and murmurs in 1907, using a carbon transmitter. Others improved the recording devices.

62. MULTIPLE ELECTRICAL STETHOSCOPE (1923).

Cabot, Richard Clark (1868-).

A multiple electrical stethoscope for teaching purposes. *J. A. M. A.*, 81:298-299, 1923.

In 1923 H. B. Williams, Richard C. Cabot, and C. J. Gamble developed an electrical stethoscope suitable for group instruction. A recording galvanometric attachment gave visual records of what was heard.

63. MULTIPLE ELECTRICAL STETHOSCOPE (1924).

Gamble, Clarence James (1894-) & Replogle, D. E.

A multiple electrical stethoscope for teaching. *J. A. M. A.*, 82:387-388, 1924.

The instrument is here described in considerable detail. References are given to the work of others on the subject.

64. PHOTOGRAPHS OF ELECTRICAL STETHOSCOPE DEVELOPED BY CABOT, GAMBLE (*et al*) AND THE WESTERN ELECTRIC COMPANY.

1. The instrument.

2. Drs. Cabot and Gamble using the electrical stethoscope.

3. The electrical stethoscope in classroom instruction.

Photographs kindly loaned by the Bell Telephone Laboratories.

65. ELECTROSTETHOGRAPH (1934).

The latest, and as yet unpublished, work in recording murmurs. It should be remembered that in order to obtain the best records the murmur is first located in the usual manner and then the electrostethograph is used to read it. The photographs show:

1. Cambridge electrostethograph for amplifying heart sounds.
2. Normal electrostethogram taken over three areas.
3. Electrostethogram taken over three areas: condition, aortic stenosis, Flint murmur.
4. Electrostethogram taken over three areas: condition, aortic stenosis.

Photograph no. 1 kindly loaned by the Cambridge Instrument Company, New York City; photographs nos. 2, 3, 4 by the Department of Physiology, Columbia University.



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NOVEMBER 8

Newer drug therapy.

A survey of drugs introduced into therapy during the past few years with a consideration of the claims made for them and the substantiating experimental and clinical evidence. Mention will be made of certain older drugs where new applications have been found.

MILTON BENJAMIN ROSENBLUTH, *Associate Physician, Bellevue Hospital.*

NOVEMBER 15

The diagnosis and treatment of intestinal infections occurring in New York City.

Acute and chronic symptoms referable to the gastrointestinal tract may result from protozoal or bacterial infection. The accompanying picture is seldom indicative of the nature of the infection. Special diagnostic methods are frequently necessary. Successful treatment often depends upon accurate identification of the invader. Therapeutic measures include medication, diet, vaccines, and sera.

THOMAS T. MACKIE, *Research Associate, Cornell University Medical College.*

NOVEMBER 22

Points in medical diagnosis.

Methods of diagnosis and differential diagnosis that a long experience has proven to be of value. Stress will be laid upon conditions in which laboratory methods are not of decisive aid. The affections touched upon will be mainly those of the chest and abdomen.

EMANUEL LIBMAN, *Consulting Physician, The Mount Sinai Hospital.*

DECEMBER 6

The significance of uterine bleeding in later life. (Lantern slides)

A brief discussion of the conditions which maintain the normal menstrual function beyond the average age of the menopause. Recognition of conditions which may cause abnormal uterine bleeding. Methods of differentiation between benign and malignant causes. Discussion of treatment appropriate to the elimination of the various underlying factors.

WILLIAM P. HEALY, Attending Surgeon, Department of Gynecology, Memorial Hospital.

DECEMBER 13

The significance of the human constitution in clinical medicine.

The lecture will discuss the structure of man in the sense, first, of the two factors supplied through inheritance and the impact of environment; and, second, that the human being is a psychosomatic entity. Disease is the expression of conflict between two clearly defined forces, one, the individual person, and the other, the outside agent. In dealing with the nature of the former, emphasis will be placed upon the fact that man is a mosaic of interdependent physical and psychological components and that he should be viewed from the biological standpoint as a whole.

GEORGE DRAPER, Associate Physician, Presbyterian Hospital.

DECEMBER 20

The present status of arthritis and the treatment of it.

World-wide statistics show that arthritis constitutes a leading sociologic and economic burden. In addition to long recognized precipitating factors, of which infection is one, most students agree that there exists a prodromal background, often hereditary. The pathology of arthritis is now conceived in terms of two main types, atrophic and hypertrophic. The underlying factors producing these are varied and there is ample evidence to incriminate the nervous and vascular as well as other systems of the body. These considerations require that therapy be adapted to the given case; but, also that it be based upon principles arising out of these premises. Results of critical therapy are gratifying. They suggest unmistakably the possibility of control of the disease as a sociologic burden.

RALPH PEMBERTON, Professor of Medicine, Graduate School of Medicine, University of Pennsylvania.

1936

JANUARY 3

Evaluation of focal infections from the internist's viewpoint.

A brief discussion of the history of the subject is presented. This is followed by a consideration of the pathology concerned. A somewhat detailed statement of the foci most frequently involved follows. The dangers of overstatement and premature conclusions of unscientific basis are considered and throughout, the therapeutic measures advisable are particularly emphasized.

HARLOW BROOKS, *Attending Physician, Bellevue Hospital.*

JANUARY 10

Recent advances in endocrine research and their value in clinical practice.

A critical presentation of recent advances in the physiology of the ductless glands, emphasizing the newer hormones and glandular inter-relationships and their clinical application. Classification of endocrine disorders on the basis of recent physiologic discoveries. Diagnostic value of recent clinical and laboratory tests in common endocrine disorders. Contribution of endocrinology to various branches of medicine: disorders of metabolism, cardiovascular diseases, gynecology, genito-urinary surgery, neuro-psychiatry. Endocrine therapy: methods of treating disordered endocrine function, endocrine and non-endocrine methods, objectives of therapy, principles of organotherapy, the clinical value of the newer glandular remedies. Treatment of endocrinopathies, indications for and clinical value of endocrine treatment in general medicine, in functional disorders, in gynecology, in neuro-psychiatry, etc.

A. S. BLUMGARTEN, *Associate Attending Physician, Lenox Hill Hospital.*

JANUARY 17

The inter-relationship of physical symptomatology and personality disorders.

The discussion will cover the various inter-relationships of physical symptoms and personality problems. A simple discussion of the physiological mechanisms and the nature of the somatic symptoms will be presented, particularly as these are encountered in incipient stages of the constitutional psychoses, hypochondriacal states, hysterical conditions and anxiety states. The discussion will also cover personality problems as complicating factors in patients who present well-defined physical pathology, such as cardiovascular disease, hyperthyroidism, etc.

HOWARD W. POTTER, *Professor of Clinical Psychiatry, Columbia University.*

JANUARY 24

The problem of the jaundiced patient.

The various types of jaundice will be discussed, and the mechanism by which jaundice is brought about will be reviewed. The major emphasis will be placed upon those conditions in which jaundice is an expression of a lesion requiring surgical attention. The preoperative study and preparation of the jaundiced patient, and the postoperative care will be reviewed. The alterations in liver function which occur in chronic hepatitis and cholangitis together with the alterations in intestinal function which occur in biliary tract disease will be presented.

I. S. RAVDIN, *Professor of Research Surgery, University of Pennsylvania School of Medicine.*

JANUARY 31

Recent advances in the diagnosis and treatment of genito-urinary infections.

ALFRED T. OSGOOD, *Professor of Urology, New York University College of Medicine.*

FEBRUARY 7

Diagnosis and treatment of diseases of the venous system.

Embryology, anatomy, pathology, pathological physiology, diagnosis, treatment, indications for and against surgery of the venous system in the extremities and body as a whole; the ambulatory and surgical methods of treating varicosities; the necessity of proper diagnosis of the degree of patency of the superficial and deep venous systems in the extremities; experience with simultaneous higher venous ligation concomitant with arterial ligation for the prevention of gangrene. The clinical importance and application of venous pressure will be reviewed.

BEVERLY CHEW SMITH, *Assistant Attending Surgeon, Presbyterian Hospital.*

FEBRUARY 14

Bulkley Lecture: The improvements in the ability of the medical profession to treat cancer.

Prior to 1896 the only method of treating cancer was to destroy the tissue by actual cautery or to remove it by excision. Through the discoveries of Roentgen and Curie, other agencies became available, and at the moment still other methods are being developed. An attempt will be made in this lecture to survey and evaluate the therapeutic capacities and limitations of the various techniques.

FRANCIS CARTER WOOD, *Director of Laboratories, St. Luke's Hospital.*

FEBRUARY 21

Feeding of infants and children by the general practitioner.

The practitioner should know the food requirements and general technic of feeding of normal and sick infants, both on breast and bottle.

The correct diet and hygiene of older children are just as important, and there is no excuse for disregarding them in the care of any child, sick or well.

CHARLES HENDEE SMITH, *Professor of Pediatrics, New York University College of Medicine.*

FEBRUARY 28

Recent advances in vitamin therapy.

ELMER V. McCOLLUM, Ph.D., *Professor of Biochemistry, Johns Hopkins University.*

MARCH 6

Diagnosis and treatment of peripheral vascular disease.

A critical review of the recent advances which have produced a new conception of the diagnosis and treatment of these diseases. Methods which have resulted in a great decrease in amputation rate will be outlined. The technic for determining the correct level for amputation, when necessary, will be given. Treatment will be stressed. The following diseases will be included: Thrombo-angiitis obliterans, Raynaud's disease, senile and diabetic arteriosclerosis, scleroderma, varicose ulcers. The status of intravenous typhoid vaccine, saline and citrate therapy, pancreatic tissue extract, the choline compounds, passive vascular exercise (paevex), sympathetic ganglionectomy, contrast baths, thermostatically controlled cradles, iontophoresis and other therapeutic measures will be considered.

IRVING S. WRIGHT, *Chief of the Vascular Clinic, New York Post-Graduate Hospital.*

MARCH 13

Agranulocytosis with special reference to hematology, etiology and treatment.

Clinical variations of agranulocytosis and its differentiation from other types of oropharyngeal infections and blood dyscrasias. Early recognition of the three types of agranulocytosis by means of the blood picture. Consideration of drugs, sepsis, and constitutional peculiarities as etiological factors. Course, complications, treatment and prognosis.

N. ROSENTHAL, *Associate in Medicine and Hematologist, The Mount Sinai Hospital.*

MARCH 20

Diagnosis and treatment of syphilis of the central nervous system.

A consideration of vascular accident in the nervous system depending upon lues; of localized luetic meningitis, the treatment of gummata, diagnosis and treatment of general paresis, tabes dorsalis, including tabetic crisis, a consideration of artificial fever therapy, tryparsamide, and other arsenical preparations.

FOSTER KENNEDY, *Professor of Clinical Neurology, Cornell University Medical College.*

MARCH 27

The ambulatory treatment of peptic ulcer.

(a) A logical and effective method, dietary and medicinal, will be described in detail for the treatment of peptic ulcer in patients continuing with their activity. Which patients come under this heading and which are to be excluded? (b) An analysis will be offered of the claims made for a number of drugs recently introduced in the treatment of peptic ulcer (citrosalven, emetine, insulin, larostidin, mutaflor, okrin, salvacid, synodal, etc.) (c) Other methods of treatment will be discussed and evaluated; duodenal intubation treatment of Einhorn; pepsin treatment of Gloessner; mucin treatment of Fogelson; alkalinized milk drip treatment of Winkelstein, etc. (d) A general diet slip which the physician can adjust and give to his individual patient for his respective gastric disturbance, will be given to the members of the audience.

A. L. GARBAT, *Attending Physician, Lenox Hill Hospital.*

APRIL 3

Recent advances in treatment of bacterial infections.

Recapitulation of present knowledge of serum therapy; a new conception of toxins as brought out by the phenomena of local and general reactivity to bacterial filtrates; the possible rôle of these toxins in chronic and subacute infections; active acquired specific immunity; passive antitoxic immunity with special reference to *B. typhosus* and *meningococcus*; interpretation of non-specific immunity; the rôle of secondary infections and possible new methods of passive and active protection against these.

GREGORY SHWARTZMAN, *Bacteriologist, The Mount Sinai Hospital.*

CHARLES NORRIS, M.D.

1867-1935

A distinguished and colorful figure was removed from the ranks of New York medicine by the death of Dr. Charles Norris, which occurred on September 11th, 1935, at the age of 67 years.

A man of fortunate birth, of scientific training, and intellectual tastes, he added to these advantages a broad acquaintance with human nature, a fine sense of humor and proportion, and democratic habits, which equipped him for success in any field, and were particularly fortunate in his work as Chief Medical Examiner of the City of New York. The abuses and absurdities of the old Coroner's system he replaced with a modern organization covering all the necessary branches of legal medicine, extended the service in a systematic manner over the entire metropolitan area, introduced high standards of scientific investigation, and placed the department on a par with the best existing in any large city in the World. He accomplished all this in an unfamiliar political atmosphere which was merely tolerant, and by dealing wisely and firmly with agents who could have little knowledge of the real significance of his work. His strong personality, backed by great technical knowledge and deep sincerity, enabled him to carry to complete success a project which in less competent hands might have ended in embarrassing failure. The initiation of the office of Chief Medical Examiner by a man of this character demonstrated to the people of this City the responsible and dignified nature of this position, and revealed the rare and peculiar qualities required for its proper conduct.

That Dr. Norris' success was based upon long preparation and training in many fields of medicine, scientific and practical, is shown by the story of his early years. He was born in Hoboken, December 4th, 1867, the son of Joseph and Frances Stevens Norris. His family had long been established at Norristown, Pa.

He attended Cutler's school in New York, was graduated from Yale Scientific School in 1888, and from the College of Physicians and Surgeons in 1892. In 1892-1894 he was an interne in the Roosevelt Hospital, serving under Delafield, Draper, and Thomson. Here he contracted small-pox, which he cheerfully accepted, and weathered the disease on North Brother Island.

After a short period in Germany, he entered the laboratory of the College of Physicians and Surgeons, and under Dr. T. Mitchell Prudden he began a series of original studies in bacteriology and pathology. His first experimental study, in 1897, concerned the bactericidal action of lymph from the thoracic duct of the dog. He developed new methods for the isolation and study of anaerobic micro-organisms, which at that time were found difficult to cultivate. Among important toxicological studies were several relating to poisoning by wood alcohol and tetra-ethyl lead.

A University career thus seemed to open, and Dr. Norris pursued it for a time by accepting a position as Professor of Pathological Anatomy in the new Cornell school, but soon he decided that a University environment was not to his liking, and in 1904 he accepted the opportunity to become head of the Department of Pathology in Bellevue Hospital. Here he made his first important contribution to medical organization, by designing and equipping the large new laboratory of Bellevue and the new City Morgue. This was the joint product of Dr. Norris and Dr. Prudden. In it they combined the City Morgue with the department of pathology of the hospital, to the great advantage of both institutions, and they provided abundant quarters for pathological service and research, as well as facilities for medico-legal autopsies and toxicology. During the following twelve years Bellevue Hospital enjoyed, for the first time in its history, a thoroughly adequate pathological service, and the morgue service was conducted with increased efficiency. In 1917 Dr. Norris was chosen as the first incumbent of the new office of Chief Medical Examiner of New York City, which after a long campaign

of agitation, replaced the old coroners system. This signal honor and responsibility came to him after a notably severe, competitive, technical examination, and very thorough consideration by competent authorities of the needs of the situation. This difficult choice proved to be most fortunate, for Dr. Norris immediately began to exhibit those remarkable qualities of professional competency and personal magnetism which carried him through many difficulties and won the confidence of all the varied interests which centre in the Medical Examiner's office. The various political figures whom he met soon seemed to recognize in him a man of absolute integrity and scientific authority. He met mayors and commissioners, doctors and patients, bereaved friends and criminals, with the same frankness and facility.

He accepted the salary of a District Court magistrate, but he delivered the services of an educated physician, a broadly trained general pathologist, an artistic technician, a resourceful scientific investigator, and an industrious business executive.

He urged the needs of his department with energy and then when failing, quietly supplied the deficiencies from his own purse. The story of his many discerning interpretations of complicated medico-legal cases has often been told in the daily Press, but the record of innumerable difficult investigations and studies of less notable cases is buried in the annals of his Office, but is fully appreciated by his colleagues. He was most skillful, artistic, and thorough in the performance of autopsies, and his capacity to interpret the signs of disease was developed to a standard fully equal to that of the famous medico-legal experts of the old Vienna school. Such a centre of influence did not fail to affect the standard of medical diagnosis throughout the entire community. New York medicine may have developed in earlier days some notable figures in legal medicine, but never before had the City enjoyed a thoroughly modern medico-legal organization.

In 1928, after ten years of service, the Academy of Medicine recognized his accomplishments by holding a complimentary dinner at which a large company of officials and friends gave warm testimony of their appreciation and esteem. Again, in 1935, the Academy of Medicine honored him with the Gold Medal of the Academy for scientific achievement and outstanding public service. On July 23rd, 1927, he was made a Chevalier de l'Ordre de Couronne by the King of Belgium. In 1933 he was appointed Professor of Forensic Medicine in New York University.

Dr. Norris was a vigorous personality. His large frame, shaggy eyebrows, piercing dark eyes, and short Vandyke beard, made him an impressive figure. His chief power lay in his broad human understanding, and clear mental processes. His mind was entirely free from obliquities and obscurities. He had a strong sense of humor which he used with devastating effect on all forms of sham and pretense, and the popular foibles of the day. Yet those who knew him best realized that he was entirely free from personal ambition, that he over-indulged in self criticism, and cultivated an almost childlike simplicity of thought. A large circle of friends deeply deplore his passing, the medical profession of New York is deprived of a unique figure, and the City administration suffers an irreparable loss. His career forms a notable chapter in the history of legal medicine in America, and his influence will survive.

JAMES EWING.

DEATHS OF FELLOWS OF THE ACADEMY

BUCKMASTER, CLARENCE WHITFIELD, M.D., 80 Ashburton Avenue, Yonkers, New York; graduated in medicine from the College of Physicians and Surgeons in 1894; elected a Fellow of the Academy October 6, 1910; died October 7, 1935. Dr. Buckmaster was a member of the County and State Medical Societies, the American Public Health Association, and a Fellow of the American Medical Association. He gained a wide reputation in the field of disease prevention as Health Commissioner in Yonkers, a position he held for fifteen years.

FRIDENBERG, ALBERT HENRY, M.D., 1 West 85 Street, New York City; graduated from the College of Physicians and Surgeons in 1877; elected a Fellow of the Academy January 25, 1886; died October 3, 1935.

HONAN, WILLIAM FRANCIS, M.D., 1000 Park Avenue, New York City; graduated in medicine from the New York Homeopathic Medical College and Hospital in 1889; elected a Fellow of the Academy February 3, 1921; died October 5, 1935. Dr. Honan was a member of the County and State Medical Societies and of the New York Gastro-Enterological Society, and a Fellow of the American Medical Association and of the American College of Surgeons. He was Consulting Surgeon at Fifth Avenue, Peck Memorial and Richmond Memorial Hospitals and Director of Thoracic Surgery at Metropolitan and Sea View Hospitals. At his death he was Professor of Clinical Surgery at the New York Homeopathic Medical College and head of the Surgical Department of Flower Hospital.

MCCABE, JOHN, M.D., 315 Central Park West, New York City; graduated in medicine from the College of Physicians and Surgeons in 1902; elected a Fellow of the Academy March 7, 1918; died October 7, 1935. Dr. McCabe was a member of the County and State Medical Societies and a Fellow of the American Medical Association. He was Visiting Physician at City Hospital, Executive Physician at Midtown Hospital and Consulting Physician at Polyclinic, Jewish Memorial and Long Beach Hospitals.

MYERS, HOWARD GILLESPIE, B.A., M.A., M.D., 26 Gramercy Park, New York City; graduated in medicine from Bellevue Hospital Medical College in 1887; elected a Fellow of the Academy February 2, 1905; died September 12, 1935. Dr. Myers was a member of the County and State Medical Societies and a Fellow of the American Medical Association.

RAYNOR, MORTIMER WILLIAMS, M.D., Bloomingdale Hospital, White Plains, New York; graduated in medicine from Syracuse University College of Medicine in 1904; elected a Fellow of the Academy November 6, 1919; died October 5, 1935. Dr. Raynor was a member of the County and State Medical Societies, the American Psychiatric Association, the New York Neurological Society, the New York Psychiatric Society, the New York Society for Clinical Psychiatry, and a Fellow of the American Medical Association. At the time of his death Dr. Raynor was Medical Director of Bloomingdale Hospital, Professor of Clinical Psychiatry at Cornell Medical College and Consulting Psychiatrist at New York Hospital.

VERPLANCK, VAN NOYES, M.D., 130 East 71 Street, New York City; graduated in medicine from Johns Hopkins Medical School in 1918; elected a Fellow of the Academy May 6, 1926; died September 11, 1935. Dr. Verplanck was a member of the County and State Medical Societies. He was Assistant Physician at Bellevue Hospital.

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Theodore W. Neumann, M.D., Physician-in-Charge

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EIGHTH ANNUAL GRADUATE FORTNIGHT

"Diseases of the Respiratory Tract"

October 21 to November 2, 1935

The Wesley M. Carpenter Lecture

ATELECTASIS, MASSIVE COLLAPSE AND RELATED POST-OPERATIVE CONDITIONS*

YANDELL HENDERSON

Professor of Applied Physiology
Yale University

In an address at a meeting of the American Medical Association twenty-four years ago, I pointed out that the methods of observation and of reasoning employed by physiologists in the study of normal processes should be applied to clinical problems also¹. In other words, we should develop a clinical physiology. It is as a problem in clinical physiology that I shall here treat the subject of atelectasis, massive collapse, and related post-operative conditions.

The lungs are peculiar organs in that they have little independent activity or self regulation. Their activity is mainly determined and controlled by influences outside the lungs themselves. A muscle can be taken out of the body and made to contract. The heart can be excised and kept beating. The kidneys likewise, if perfused, will function independently of the rest of the body. But the lungs, once out of the chest and separated from the heart, are mere masses of tissue devoid of activity.

* Delivered October 21, 1935. This is the only lecture of this year's Graduate Fortnight to be published by the Academy. All the papers presented at the evening meetings will be published in book form by W. B. Saunders Company.

If this is true of the normal physiology of the lungs, we should expect—and in fact we find—that in their abnormal physiology the dominant influences are generally not developed in the lungs themselves; they are induced by conditions in other parts of the body.

Massive collapse of an entire lung is so striking a phenomenon that some investigators have been tempted to look for its cause in an active contraction under some nervous influence. Some such reaction as this can be seen in a frog when the vagus is stimulated and the lung is thereby caused to contract. The human lung is permeated with non-striated muscle fibres² and it is probable that either over-activity or failure of these minute muscles plays an important part in asthma and emphysema. In general the elasticity of the various parts of the body is due rather to the muscular than to the connective tissues. We have learned recently that the elasticity of the systemic arterial system is partly due to the non-striated muscle fibres in the walls of the blood vessels³; and doubtless the muscular element in the structure of the lungs plays a large part in their elasticity. From their structure we should almost expect the lungs to exhibit contractions like the stomach or the bladder. But such a reaction, if it occurs at all in the development of atelectasis, is of relatively small importance compared to the mechanical influences that are extrinsic to the lungs⁴.

Of all the influences upon the lungs involved in the development of post-operative atelectasis and massive collapse, by far the most important is that of the size of the thorax: its expansion or contraction. The size of the thorax is determined by the contraction or relaxation of the thoracic muscles. The intercostals, scaleni and levators, which lift and spread the ribs, play a considerable part. But it is the diaphragm that by its contraction and relaxation is the main factor in variations in the size of the thorax; and these variations extend from maximal inflation of the lungs down to atelectatic deflation. When Sir James Barr⁵ first recognized massive collapse of a lung as a sequel

of a surgical operation, he came very close to the true explanation of its underlying cause; he assigned it to "paralysis of the diaphragm" and treated it successfully with "a course of respiratory gymnastics." And if we change the word paralysis to "abolition of tonus" and extend this conception of loss of tonus to all the respiratory muscles, and indeed to all the muscles of the body, we have before us the condition that underlies not only atelectasis and massive collapse, but also, as I shall try to show, practically all of the other features of post-operative depression of functions⁶.

The full practical significance of tonus has not yet, I believe, been realized either by physiologists or clinicians. It is the essential feature in the physical depression that follows alike after surgical operations, physical injuries, anesthesia and severe illness. Tonus is chiefly manifested by muscles, but it is induced in the muscles largely by the influence of the nervous system, as well as by the metabolism and respiration of the muscles themselves. Tonus is thus an index of the state of the nervous system, and an expression of the vitality of the body as a whole.

Physiologists, especially those interested in the nervous system, understand fully that posture, particularly the ability to stand erect, or to hold up one's head, is dependent upon tonus. But the step from this physiological conception to its clinical corollary is not generally made. It is not sufficiently emphasized, or even generally realized, that when a patient is too weak to stand or even to hold up his head, his condition is generally one of extremely low tonus.

The significance of tonus in respiration⁷, and particularly in the maintenance of the capacity of the thorax, may be illustrated by the following observations⁸: Some twenty years ago, while testing the efficiency of various methods of manual artificial respiration, I performed the following experiment. A cat was placed under moderate chloroform anesthesia; its trachea was connected with a small spirometer and the volume of air breathed in a minute was

recorded. A fatal dose of chloroform was then quickly administered and respiration, and the heart action, stopped finally. When the trachea was again connected with the spirometer and artificial respiration was performed by squeezing the thorax, a nearly normal volume of air was at first expelled from the lungs; and when the pressure upon the thorax was released the same volume of air was drawn in again. This inspiration was entirely due to the elastic recoil of the thoracic muscles and diaphragm. But, as the centers in the nervous system failed under asphyxia, the elasticity of the thorax was gradually abolished, and less and less air was drawn in each time that compression was released, until after about ten minutes, when the body was entirely flaccid, there was no movement of air whatever in or out of the lungs. Compression of the thorax by the operator's hands caused no air to be expired, for the chest was already deflated. And no air was drawn in, for the elastic recoil of the muscles was abolished with the entire loss of tonus.

This loss of tonus, abolition of elasticity and collapse of the chest is not a mere laboratory observation on animals. My associate, Dr. H. W. Haggard⁹, has had an opportunity to make a similar observation on a man just dead from a heart attack. At first manual artificial respiration expelled air from the lungs and the tonic elasticity of the chest drew air in again. Then as the nerve centers controlling tonus failed under asphyxia, the elastic recoil of the respiratory muscles diminished until the thorax was deflated down to the size natural in a corpse.

A similar, if less extreme, observation was made twenty years ago in my laboratory upon normal men, that is medical students, as part of a regular class exercise. The manual prone pressure method of artificial respiration was applied by one student to another; and the volume of the pulmonary ventilation thus induced was determined. The volume of air exhaled and inhaled under this rhythmic compression of the chest was found to be in all cases almost exactly the same as that of natural breathing. This observation was at first very surprising, until its explanation was found. It means merely that the respiratory center regulates the tonus of the thoracic muscles and diaphragm to such a degree of elasticity that the chest expands exactly

enough alike after each normal expiration and each artificial compression to afford precisely the amount of pulmonary ventilation that the man normally needs to supply oxygen and remove carbon dioxide. The subjects were then directed to perform voluntary overbreathing for a couple of minutes, so as to overventilate the lungs. Because of the apnea thus induced, the subject thereafter breathed subnormally for a time, or even stopped entirely. And when the rhythmic compression of the chest was applied during this period of apnea, it was found that much less air was moved out of the chest, and correspondingly little was drawn in.

More recently x-ray pictures have shown that in men during apnea, after forced breathing, the position of the chest is essentially that of passive expiration¹⁰. Evidently the elasticity that normally keeps the thorax expanded is not a mere mechanical condition, but rather a vital property under the control of the nervous system and particularly of that part of the nervous system that we call the respiratory center. If tonus is diminished artificially by overbreathing, the elasticity is correspondingly diminished. In the depression of vitality that follows long anesthesia and extensive surgical operations, the chest cavity is so much decreased that the lungs are nearly deflated. A healthy man under normal conditions has more than twice as much air in his lungs as a corpse. It is probable that from the first breath of life until after the last the diaphragm is never completely relaxed.

Turning now to observations upon patients after surgical operations, it has been found by a number of observers¹¹ that the vital capacity, that is, the maximum volume of air that a patient can exhale may be decreased by as much as fifty per cent. In this decrease it is evident that the relaxation of the diaphragm plays a critical part, for it may be relaxed to such an extent that in x-ray pictures its shadow is as much as 7 or 8 centimeters headward from its normal position. This is as far or farther than the diaphragm moves under the deepest and most forcible voluntary expiration.

The sum and substance of all these observations is that when vitality is reduced the tonus of all the muscles in the body is correspondingly diminished. In the thorax par-

ticularly this decrease of tonus results in such a diminution of the size of the thoracic cavity and such a deflation of the lungs that many minute deaerated areas are produced.

This condition in its simple uncomplicated form has been well termed "collapse without symptoms¹²." When it is looked for it has been found after more than 80 per cent of all laparotomies. It is always accompanied by shallow respiration and rapid pulse.

This condition is so common that we may almost call it a normal sequel of major surgical operations. Why then, is massive collapse not more common than it is? Why does it occur in some cases and not in all? The reason for this is apparently one of pure chance. With the lungs partially deflated, it sometimes happens that mucus accumulates in one or another of the major airways until it is completely closed. In that part of the lung which is thus occluded, another development then sets in. The gasses contained in the occluded lobe or lung are absorbed into the blood and the lobe or lung in the course of time—generally a rather short time—is completely collapsed. As one lung collapses it draws the mediastinum after it and atmospheric pressure inflates the other lung. Hence massive collapse is almost necessarily confined to one lung for the collapse of one lung tends to expand the other. We owe this conception to Dr. P. N. Coryllos¹³.

The absorption of air from an occluded lung is not a vital reaction, but a purely physical process. It is distinct from the simple atelectasis from loss of tonus that we have been discussing. The preceding partial deflation permits the plugging of an airway. The closure of an airway, however produced, is then the sole causative condition. The air from an occluded lobe or lung is absorbed in exactly the same way that air is absorbed from any other body cavity such as the pleural cavity, into which air, or any other non-irritant gas, has been injected. The explanation of how and why a lung is collapsed by absorption of its gaseous contents, whenever the airway to that lung or lobe is blocked, is exactly the same as the explanation of the re-

absorption of the air from a pleural space and the consequent reinflation of a tuberculous lung that has been collapsed by pneumothorax. In both cases the absorption is due to the partial pressures of the gases concerned; and in neither case does blood pressure play any part whatever.

In brief, the physics of the process of absorption is as follows: In the lungs, so long as they are in free connection with the outside air, the total pressure of all the gases, oxygen, carbon dioxide, nitrogen, and water vapor, is the same as that of the atmospheric pressure in the outside air. Very nearly the same gas pressures prevail in the arterial blood as it leaves the lungs. In the tissues oxygen is absorbed and carbon dioxide is produced in nearly equal amounts. But owing to the difference in the manner in which oxygen and carbon dioxide respectively are held in the blood, the pressure of oxygen in the venous blood is greatly decreased, while the pressure of carbon dioxide is only slightly increased. The sum of the pressures of these two gases in the venous blood is therefore very much less than the sum of their pressures in the arterial blood. The partial pressure of nitrogen is, however, the same in both arterial and venous blood.

Suppose now that a few hundred cubic centimeters of air are injected into any body space, such for instance as the abdomen. At first carbon dioxide is given off from the blood and the tissues to the occluded air and part of its oxygen is absorbed. But the gaseous equilibrium that is thus approached, although never reached, approximates the gas pressure in the venous blood rather than the arterial blood; and more oxygen is therefore absorbed from this air than the carbon dioxide that diffuses into it. The volume of the air is thus decreased and as atmospheric pressure bears upon the exterior of the abdomen and as the soft tissues yield easily to atmospheric pressure, the space is decreased. As a result the nitrogen of the occluded air is now contained in a smaller space than before and its partial pressure, therefore, is raised above its original pressure and thus also above the pressure of nitrogen in the blood.

It is one of the fundamental laws of gases that each gas diffuses according to its own partial pressure regardless of what other gases may be present. Accordingly, a part of the nitrogen in this space that we are considering diffuses into the blood; and the total volume of the occluded gases is thus further decreased, and brings the partial pressure of the oxygen and carbon dioxide in the diminishing space again into relative excess above the pressures of these gases in the venous blood into which they therefore diffuse further. And, as a result of the continual interaction of these processes, any air that is injected into the abdominal cavity, or the pleural cavity, or any other body cavity is gradually absorbed under the influence of purely physical principles.

Similarly air that is occluded in a lung by a plug in a bronchus is gradually absorbed into the blood. And as it is absorbed, the lung is gradually collapsed under the pressure of the atmosphere bearing down through the trachea and bronchi into the other lung, and by elevation of the diaphragm by the pressure of the atmosphere upon the abdomen. This appears to be the complete explanation of why it is that a plug in a main bronchus results in collapse of the lung on that side, and an expansion of the other lung to fill part of the space.

The final confirmation of this purely physical explanation is that when, by means of bronchoscopy, a plug of mucus or other material is removed from a bronchus, the collapsed lung, as Chevalier Jackson¹⁵ has shown, is rapidly reinflated by the negative pressure of the thorax aided by the movements of respiration. And, of course, the deeper the respiration, the greater the negative pressure and the greater the expansive force tending to reinflate the lung.

All of these facts point clearly to the conclusion that the decrease of vitality consequent upon major surgical operations involves a general decrease of body tonus. Owing to the decrease of tonus of the respiratory muscles and particularly of the diaphragm, the volume of the lungs is decreased to the point at which lobular atelectasis, collection of mucus, plugging of airways, and finally massive collapse may occur.

I shall not stop now to consider those cases, fortunately rather rare, in which infection develops in the occluded lung. I must, however, emphasize as strongly as I can, the point that the lungs are normally the best drained organs in the entire body, and that the airways are normally kept clear by ciliary movements and by the cough reflex: one of the most vigorous reactions of all those provided by Nature for the protection of the body. For this reason we should expect, as in fact we find, that occlusion of the airways plays an exceedingly serious and damaging part in pulmonary infections¹⁶. Pneumonia, as the internist sees it, is a topic outside the range of this

lecture, but I venture again¹⁷ to point out, that in regard to pneumonia internists would do well to borrow from surgery one of its major axioms: a well-drained infection is relatively harmless; an occluded infection is always dangerous. Evidence is accumulating that those measures which surgeons and anesthetists find effective in preventing or relieving post-operative atelectasis and massive collapse are also useful if administered within 48 hours of the onset of pneumonia¹⁸.

The gist of these measures, for the internist as for the surgeon, is as follows: Pure carbon dioxide is administered by means of an open mask in which the gas (2 to 3 liters a minute) mixes with the inhaled air. The inhalation is given for only a few minutes, but long enough and strong enough to induce marked hyperpnea. After five minutes rest it is repeated; and thereafter these two inhalations are administered at regular intervals of three to four hours. This technique is now extensively applied in the early stages of pneumonia by Dr. Lewis Gunther¹⁹ and his colleagues in Los Angeles. He writes me that "the first inhalation generally causes severe coughing, which brings up surprisingly large amounts of yellow pus. The patient is considerably fatigued, but drops asleep, and awakens feeling and appearing better. Resolution occurs earlier than in untreated cases." Such observations, even though the series is still small, justify a wide trial, particularly in the early stages of pneumonia in children.

As the pulmonary circulation influences, and is influenced by, all of the conditions discussed in this paper, a few words on this subject are here in order: The volume of blood in the lungs and the volume flowing through the lungs may vary together or independently of each other. They are affected by three chief influences: (a) vasomotor nerves, (b) the efficiency of the heart, and (c) the degree of inflation of the lungs.

(a) Experimental evidence indicates that there are vasomotor nerves to the pulmonary blood vessels, and that the lungs form one of the reservoirs from which blood may be shifted when needed elsewhere. But it appears that this adjustment does not alter appreciably the volume of blood flowing through the lungs; for any restriction there would correspondingly diminish the circulation of the entire body: an effect like that of a pulmonary embolus.

(b) The left ventricle of the heart is both normally and abnormally the main factor determining the volume of blood in the lungs. Normally the diastolic receptive relaxation of that ventricle takes from the pulmonary veins in a minute exactly as much blood as the right heart pumps into the pulmonary artery; but never more than that volume. Such a condition as depletion of the pulmonary circulation is therefore impossible.²⁰ It never occurs. On the other hand, whenever the left ventricle fails to accept easily the volume of blood coming to it—whether because of valvular defects or impeded diastolic relaxation and filling—the volume of blood in the lungs is increased. The volume of blood flowing through the lungs is, however, determined almost entirely by the right heart and by the volume of the venous return to that side of the heart.

(c) Expansion of the thorax causes the lungs to hold, not only more air, but probably more blood also. When a lung or a part of a lung is collapsed, both the volume of blood in it and even more the volume flowing through it are decreased. The total flow through the lungs, however, is not decreased; instead, there is a compensatory increase of flow through the lung, or parts of the lung, that are still inflated; and the blood is thus aerated. This adjustment is seen in patients in whom a therapeutic pneumothorax has been produced. A tuberculous patient is not rendered cyanotic when one lung is partially, or even completely, deflated.

I return now to post-operative depression and particularly to the depression of the circulation that often accompanies atelectasis. This is the condition which, in its extreme form, was formerly called "surgical shock." I say formerly, because I find that no self-respecting surgeon is now willing to admit that any of his patients ever reaches a condition that he is willing to have a mere physiologist call "shock." I will, therefore, speak of this condition only as "post-operative circulatory depression."

The large majority of all human beings die through gradual depression and final failure of the circulation²¹. As the result of a vast amount of investigation we know now what factor in the circulation it is that fails; but until recently we have not known just how or why this factor fails. Here normal physiology and clinical physiology present two closely related problems; one the converse of the other. One is the problem of how in health the normal circulation is maintained; the other is the problem of how in illness and vital depression the circulation fails. We know that the heart is a pump that, so to speak, lifts the blood from the

low pressure in the veins up to the high pressure in the arteries and we know that the vasomotor nervous system controls the distribution of the blood and maintains arterial pressure. But the volume of blood that the heart can pump is limited by the volume that comes to it through the veins from the reservoirs of blood in the tissues. Thus beside the heart and the vasomotor mechanism, there is a third major factor in the circulation: the factor that determines the volume of blood returning to the heart through the veins. To this factor I gave the name of the "venopressor mechanism" and it is now generally recognized that in the great majority of cases depression of the circulation is not due to failure of the heart, nor of the vasomotor system. It is due rather to a gradual decrease in the volume of blood returning to the heart: that is, to the progressive depression and final failure of the venopressor mechanism.

Recently we have made observations in New Haven from which we can define the nature of the venopressor mechanism; and we find that the principal factor in it is the general tonus of the musculature of the body, both skeletal and visceral²². Everyone recognizes that in the physical depression following a major surgical operation, or after a serious illness or an attack of influenza, there are two outstanding conditions: the tonus of the body is lessened and the circulation is weakened. In addition, in post-operative depression without infection or fever, there is also a decrease of metabolism, oxygen consumption and heat production. Heretofore, the decrease of tonus has generally been imputed to a poor circulation. In reality, as facts I am about to state seem to me to indicate, the poor circulation is due to a diminished venous return to the heart, which in turn along with the depression of metabolism is due to lowered body tonus.

It is well recognized that every movement of the limbs and every contraction of the abdominal muscles tends to promote the flow of blood through the venous system back to the heart. But it has not heretofore been realized that in the healthy body, the tonic contraction of the muscles main-

tains continually a pressure within the tissues appreciably above that of the outside atmosphere. This pressure between the fibres of a muscle under tension arises in much the same way that pressure between the strands of a rope is produced by a longitudinal pull upon the rope. The pressure amounts, even in a relaxed but still tonic muscle, to 50-70 mm. of water column during complete rest. When muscle tonus is increased, the pressure is higher, up to 90 mm. or more. When tonus is abolished, as it is in a moribund man or animal, the internal pressure is also abolished. The method of measuring this pressure is to thrust a hypodermic needle into the middle of a muscle, usually the biceps, and to determine the pressure required to induce a minute amount of saline to run in. This intramuscular pressure is too small to have any considerable direct effect upon arterial blood pressure and the flow of blood into a muscle; but it is quite sufficient to exert a strong influence upon the venous outflow from a muscle. It is one of the first principles of hydraulics that a fluid tends to flow from a place of high pressure to one of lower pressure; and the greater the difference of pressure the more rapid the flow.

I am not for a moment denying or questioning the correctness of the opinion that the entire energy of the circulation during bodily rest is due to the push from behind imparted to the blood by the left heart. But, in order to push the blood not only from the heart to the tissues, but also onward from the tissues back through the veins to the heart, it is essential that some of the force imparted by the heart shall be conserved up to the completion of the circuit. And so long as the tissues of the body have tonus, elasticity and an internal pressure, a part of the force imparted to the blood by the heart is retained by the blood in the vessels within and beneath the muscles. It is this force that presses the blood on into the veins, and thus supplies the right heart and supports the circulation. On the other hand, when muscle tonus is depressed or fails, the entire force of arterial pressure is lost in the flaccid tissues and the blood stagnates there instead of flowing on back to the right heart.

Nor is this all. As we have seen, the depression of muscular tonus permits the thorax to diminish in size and the lungs to collapse toward atelectasis. And thereby another handicap is imposed upon the circulation; for as the lungs deflate, the negative pressure of the intrapleural space decreases. So long as the thorax and lungs are normally expanded this negative pressure is one of the main accessory factors aiding in drawing blood into the right heart. When the tonus of the body is diminished, not only is the positive pressure in the body as a whole diminished correspondingly, but the negative pressure of the thorax also.

The point to be emphasized is that the part played by general body tonus is distinct from that of vasomotor tonus. Vasomotor tonus determines the height of arterial pressure. The general tonus of the body and intra-tissue pressure determine the volume of the venous return to the heart and the volume of the output of the heart. In progressive vital depression it is general tonus that fails first. The output of the heart is thus diminished. It is only after the volume of the circulation has been thus greatly decreased that arterial pressure fails. Almost to the last the vasomotor mechanism, instead of failing, strives by an extreme constriction of the arteries and arterioles to maintain arterial pressure in spite of the diminishing output of the heart. This is the process leading to the large majority of all deaths.

Evidently the general tonus of the body is a function of supreme importance. When we learn how to conserve it, we shall at the same time have learned both how to prevent atelectasis and also how to prevent depression and failure of the circulation: in other words, to prevent patients from dying. And undoubtedly, without fully realizing it, internists dealing with prostrating illness and surgeons and anesthetists dealing with serious operations have learned to avoid those procedures that tend to diminish tonus and to utilize those that tend to conserve this supremely important factor in vitality. But the explicit recognition that it is tonus that must be conserved, will be a long step forward. We shall understand much that is now obscure.

As an illustration take the subject of spinal anesthesia. Atelectasis follows spinal anesthesia almost or quite as frequently as it does inhalational anesthesia. And this is exactly what we should expect when we realize that spinal anesthesia not only blocks off sensation, it also abolishes tonus in those parts of the body that are anesthetized and probably in many cases it also depresses the tonus of the entire body.

Another feature of spinal anesthesia is that even a quite moderate loss of blood is sometimes fatal, as should be expected, when tonus has been depressed and a large part of all the blood in the body rendered more or less stagnant.

A third feature of spinal anesthesia is highly significant. Pulmonary complications are fairly common sequelae of spinal anesthesia, yet no direct irritation of the lungs possibly occurs. It is logical, therefore, to infer that when atelectasis follows an inhalational anesthesia the cause is not direct pulmonary irritation, but diminished bodily tonus. Irritation of the lungs by the gases of war induces edema, not massive collapse²³. There is therefore, little if any ground left for the belief once general that irritation of the lungs by the vapor of ether or other volatile anesthetics is the cause of pulmonary complications after inhalational anesthesia. The underlying cause of post-operative atelectasis after any form of anesthesia, alike spinal or inhalational, is diminished body tonus and the consequent deflation and collapse of the lungs.

Finally we face the questions: Normally, what are the factors that cause and maintain tonus? Abnormally, why does tonus fail?

In the main, certainly, the tonic contractions of striated muscles are induced through the same nerve fibres through which voluntary contractions are mediated. Many influences bear upon the anterior horn cells in the spinal cord from which the motor fibres come. Among these influences the proprioceptor afferent fibres from the muscles themselves play an important part in the tonus that maintains

the erect position. Both the cerebrum and the cerebellum exert powerful influences upon the tonic nerve impulses discharged from the motor centers in the spinal cord.

There are also reflex influences from the skin. Even such mild stimulation of the skin as that afforded by a comfortably cool temperature and air movement in a well ventilated room has an influence in maintaining a good tonus. On the other hand, in a badly ventilated and uncomfortable room this influence results in a decrease of tonus and induces a diminished intramuscular pressure²⁴.

The respiratory center exerts at times a dominating control, not only over the respiratory muscles, but over the entire musculature of the body. Even the slight depression of respiration induced by voluntary overbreathing causes a marked decrease in the tonus of all of the respiratory muscles. Profound anesthesia may stop respiration and abolish tonus. The demand of the surgeon for extreme relaxation increases the tendency to serious post-operative sequelae. On the other hand, stimulation of respiration by carbon dioxide increases not only the volume of breathing, but also the tonus of the respiratory and other muscles. The thorax is expanded, and the lungs are cleared²⁵. The venous return to the right heart is increased; and the circulation is thus restored and supported.

There remains however much still to be learned regarding the normal physiology of tonus, and far more regarding the clinical physiology of depression of tonus.

When that fuller knowledge is gained it will doubtless yield means and methods of resuscitation more effective than any now available. But even then, and always, it will be necessary to keep in mind that every measure of restoration may fail, if atelectasis has gone too far; if a plug is too firmly impacted in a bronchus; or if the circulation has failed to the point of asphyxia of the tissues. Far more important than any possible measure of restoration is the conservation of the patient's vitality. The requirements for

conservation are skillful anesthesia and surgery that traumatizes as little as possible. The extent to which vitality has been depressed or conserved is shown in the patient's tonus after the operation. To a very large extent vitality is tonus.

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Library Notes

FIELDING H. GARRISON

Articles and Book Reviews

in the

Bulletin of The New York Academy of Medicine

At the suggestion of Mr. Leonard L. Mackall, one of our Library Consultants, this list of the late Col. Fielding H. Garrison's articles and book reviews published in the *Bulletin of The New York Academy of Medicine*, has been compiled by members of the staff of the Library. The entries are numbered and arranged alphabetically under subject; but in addition, cross references to the reviews are given under the names of authors. In the case of papers which have two or more subjects, cross references from these are included. For the sake of those who keep their *Bulletin* unbound, Mr. Mackall suggested that in the references the month be given. Col. Garrison's articles were much appreciated when they appeared, and it is hoped that this subject list will prove helpful.

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INSULIN, *see* no. 21.D'IRSAY, S., *see* no. 33.KING'S COLLEGE SCHOOL, *see* no. 6.KLEBS, A. C., *see* no. 59.KRETSCHMER, E., *see* no. 17.

LAENNEC

46. Laennec. *Bull.*, Aug. 1926, 2. s., 2:389-393.

LIGHTING, *see* no. 35.

LISTER, J.

47. Lister in relation to the Victorian background. *Bull. Supplement*, Jan. 1928, 2. s., 4:167-172.

LONG, E. R., *see* no. 57.MACCALLUM, W. G., *see* no. 34.

MASSACHUSETTS

48. Book review. Medicine in Massachusetts. [*A brief history of medicine in Massachusetts*, by Henry R. Viets. Boston, 1930]. *Bull.*, Nov. 1930, 2. s., 6:734-735.

MEDICINE

49. Book review. An introduction to medicine. [*Einführung in die Medizin*, von Henry E. Sigerist. Leipzig, 1931]. *Bull.*, Apr. 1931, 2. s., 7:285-286.

MOTT, V.

50. Valentine Mott. *Bull.*, Aug. 1925, 2. s., 1:209-214.

NATURE HEALING

51. Book review. The healing power of nature. [*Die Lehre von der Heilkraft der Natur im Wandel der Zeiten*, von Max Neuberger. Stuttgart, 1926.] *Bull.*, July 1927, 2. s., 3:479-480.

NAUNYN, B.

52. Book review. Naunyn's autobiography. [*Erinnerungen, Gedanken und Meinungen*, by B. Naunyn. München, 1925]. *Bull.*, Sept. 1928, 2. s., 4:941-953.

NEUBERGER, M., *see* no. 51.NEW YORK ACADEMY OF MEDICINE, *see* no. 65.

OCCUPATIONS

53. Life as an occupational disease. *Bull.*, Dec. 1934, 2. s., 10:679-694.
- OSLER, W.**
54. Osleriana. *Bull.*, Apr. 1929, 2. s., 5:365-366.
55. Book review. Maude Abbott's Osler memorials. [*Bulletin No. IX of the International Association of Medical Museums. Sir William Osler Memorial Number. Appreciations and Reminiscences*. Montreal, 1926]. *Bull.*, Dec. 1926, 2. s., 2:539-545.
56. Book review. The Osler catalogue. *Bibliotheca Osleriana . . .* Oxford, 1929. *Bull.*, Sept. 1929, 2. s., 5:860-863.

PAGEL, J., see no. 8.

PATHOLOGY

57. Book review. Two notable source-books. [*Selected readings in pathology from Hippocrates to Virchow*. Ed. by Esmond R. Long . . . Springfield, Ill., 1930. *Selected readings in physiology*. Ed. by J. F. Fulton. Springfield, Ill., 1930]. *Bull.*, Jan. 1931, 2. s., 7:37-39.

PEDIATRICS

58. Book review. Greek pediatrics. [*Pädiatrie in Hellas und Rom.*, by Sophokles Ghinopoulos. Jena, 1930]. *Bull.*, Sept. 1930, 2. s., 6:630-631.

PEST-TRACTS

59. Book review. Mediaeval pest-tracts and dream-books. [*Documents scientifiques du XV^e siècle. I. Remédes contre la peste . . .* by A. C. Klebs and E. Droz. Paris, 1925. II. *La clef des songes*, by Maurice Hélin. Paris, 1925]. *Bull.*, July 1926, 2. s., 2:381-383.

PHYSICIANS

60. The evil spoken of physicians and the answer thereto. *Bull.*, Feb. 1929, 2. s., 5:145-157.

PHYSIOLOGY, *see* no. 57.

PROTEINS

61. Protein stimulation (local death) and protein therapy. *Bull.*, Sept.-Oct. 1927, 2. s., 3:555-560.

PROVERBS

62. Medical proverbs, aphorisms and epigrams. *Bull.*, Oct. 1928, 2. s., 4:979-1005.

PUBLIC HEALTH

63. Book review. *Public health in theory and practice: an historical review*. [By William Henry Welch . . . New Haven, 1925]. *Bull.*, Dec. 1925, 2. s., 1:440-442.

QUACKERY

64. On quackery as a reversion to primitive medicine. *Bull.*, Nov. 1933, 2. s., 9:601-612.

QUARANTINE IN NEW YORK

65. The Academy of Medicine as a prime mover in quarantine legislation. *Bull.*, Mar. 1926, 2. s., 2:123-127.
66. The destruction of the quarantine station on Staten Island in 1858. *Bull.*, Jan. 1926, 2. s., 2:1-5.

RAMÓN Y CAJAL, S.

67. *Book review*, Ramón y Cajal. [*Recuerdos de mi vida*. 2. ed., by S. Ramón y Cajal. Madrid, 1928]. *Bull.*, June 1929, 2. s., 5:483-508.

RETICULO-ENDOTHELIAL SYSTEM

68. The reticulo-endothelial system. *Bull.*, July 1926, 2. s., 2:339-343.

ROLLESTON, H. D., *see* no. 1.ROUS, P., *see* no. 20.

RUSSIA

69. Russian medicine under the old régime. *Bull.*, Sept. 1931, 2. s., 7:693-734.

SALPETRIERE, *see* no. 13.

SCHUMANN, R.

70. The medical history of Robert Schumann and his family. *Bull.*, Sept. 1934, 2. s., 10:523-538.

SEGATO, G.

71. A note on Girolamo Segato. *Bull.*, July 1927, 2. s., 3:481.

SEWAGE, *see* no. 77.SIGERIST, H. E., *see* no. 49.SINGER, C., *see* no. 3.

SKIN

72. The skin as a functional organ of the body. *Bull.*, July 1933, 2. s., 9:417-432.

SPAIN

73. An epitome of the history of Spanish medicine. *Bull.*, Aug. 1931, 2. s., 7:589-634.

STATEN ISLAND, *see* no. 66.STREETER, E. C., *see* no. 10.

SURGERY

74. *Book review*. A new history of surgery. [*Kurze Geschichte der Chirurgie*, von W. von Brunn. Berlin, 1928]. *Bull.*, July 1928, 2. s., 4:839-841.

SYDENHAM, T.

75. On Sydenham's view of causation in the light of seventeenth century thought. *Bull.*, Feb. 1933, 2. s., 9:53-68.

UNITED STATES (West)

76. A medical tour in the West. *Bull.*, May 1929, 2. s., 5:391-412.

VENTILATION, *see* no. 35.VIETS, H. R., *see* no. 48.VIRUSES, *see* no. 5.

WATER-WORKS

77. The history of drainage, irrigation, sewage-disposal and water-supply. *Bull.*, Oct. 1929, 2. s., 5:887-938.

WELCH, W. H., *see* no. 63.

RECENT ACCESSIONS TO THE LIBRARY

SEPTEMBER

- American Society for the Control of Cancer. New York City Cancer Committee. On health's highway; progress in relation to cancer control.
N. Y., N. Y. City Cancer Comm., [1935], 17 1.
- Baló, J. Die unsichtbaren Krankheitserreger.
Berlin, Karger, 1935, 311 p.
- Barycz, H. Historja Uniwersytetu Jagiellonskiego w epoce humanizmu.
Kraków, Univ. Jagiellonski, 1935, 162 p.
- Bubis, J. L. Puerperal gynecology. Balt., Wood, 1935, 199 p.
- Collison, W. E. Inhalation therapy technique.
London, Heinemann, 1935, 77 p.
- Coman, D. R. The technique of post mortem examination.
Montreal, Renouf, [1934], 47 p.
- Dominguez y Roldan, F. Docteur Carlos J. Finlay . . .
Paris, Arnette, 1935, 302 p.
- Earle, F. M. & Kilgour, J. A vocational guidance research in Fife.
London, Nat. Inst. of Ind. Psych., [1935], 101 p.
- Fichera, G. Chemioterapia del cancro.
Milano, Hoepli, 1934, 213 p.
- Gay, F. P. [et al]. Agents of disease and host resistance.
Springfield, Ill., Thomas, [1935], 1581 p.
- Geissendorfer, R. Thrombose und Embolie.
Leipzig, Barth, 1935, 159 p.
- Godin, P. Recherches anthropométriques sur la croissance des diverses parties du corps. 2. éd.
Paris, Legrand, 1935, 268 p.
- Greenwood, M. Epidemics and crowd-diseases; an introduction to the study of epidemiology.
London, Williams, [1935], 409 p.
- International Labour Office. International comparisons of cost of living.
Geneva, 1934, 146 p.
- Jennings, H. S. Genetics.
N. Y., Norton, [1935], 373 p.
- Jordan, E. O. A textbook of general bacteriology. 11. ed.
Phil., Saunders, 1935, 825 p.
- von Lanz, T. & Wachsmuth, W. Praktische Anatomie: Arm.
Berlin, Springer, 1935, v. I, pt. 3.
- Lescoeur, L. Représentation graphique de la caractéristique physico-chimique de l'organisme . . .
Paris, Masson, 1934, 72 p.
- Martini, P. Principles and practice of physical diagnosis.
Phil., Lippincott, [1935], 213 p.
- Mills, G. P. & Humphreys, H. A text-book of surgery for dental students.
4. ed. London, Arnold, [1935], 342 p.
- Morton, R. A. The application of absorption spectra to the study of vitamins and hormones. London, Hilger, [1935], 70 p.

- Mount Sinai Hospital, N. Y. Manual of procedures for the house staff.
Revised 1935.
[N. Y., 1935], 102 numb. 1.
- Newsholme, (Sir) A. Fifty years in public health; a personal narrative with comments. London, Allen, [1935], v. 1.
- Pfeifer, R. A. Kreislauf und Hirntuberkulose.
Dresden, Steinkopff, 1935, 110 p.
- Ponroy, & Psaume, M. Restauration et prothèse maxillo-faciales.
Paris, Masson, 1935, 502 p.
- Pujiula, J. Histología fisiologica y anatomía microscópica.
Barcelona, Casals, 1934, 441 p.
- Putti, V. Anatomia della lussazione congenita dell'anca.
Bologna, Cappelli, 1935, 234 p.
- Ranson, S. W. The anatomy of the nervous system from the standpoint of development and function. 5. ed.
Phil., Saunders, 1935, 501 p.
- Rosenau, M. J. Preventive medicine and hygiene. 6. ed.
N. Y., Appleton-Century, [1935], 1481 p.
- St. Mark's Hospital, London, Medical Committee. Collected papers of St. Mark's Hospital, London, including a history of the Hospital.
London, Lewis, 1935, 440 p.
- Scheer, K. Kinderkrankheiten (ohne Infektionskrankheiten) und Ernährungslehre. Dresden, Steinkopff, 1935, 150 p.
- Schliephake, E. Short wave therapy.
London, Actinic Press, [1935], 238 p.
- Schum, H. Einführung in die Wehrchirurgie.
Stuttgart, Enke, 1935, v. 1.
- van Stockum, M. J. New principles of anti-rabic treatment.
Hague, Nijhoff, 1935, v. 1.
- Stokes, J. H. Dermatology and syphilology for nurses. 2. ed.
Phil., Saunders, 1935, 368 p.
- Todd, J. C. & Sanford, A. H. Clinical diagnosis by laboratory methods.
8. ed. Phil., Saunders, 1935, 792 p.
- Weisenberg, T. H. & McBride, K. E. Aphasia.
N. Y., Commonwealth Fund, 1935, 634 p.
- Weiss, S. Diseases of the liver, gallbladder, ducts & pancreas, their diagnosis & treatment.
N. Y., Hoeber, 1935, 1099 p.
- Weyl, C. & Warren, S. R. Apparatus & technique for roentgenography of the chest. Springfield, Ill., Thomas, 1935, 166 p.
- Whitby, L. E. H. & Britton, C. J. C. Disorders of the blood.
London, Churchill, 1935, 543 p.
- Whitney, L. F. The case for sterilisation.
London, Lane, [1935], 215 p.
- Zondek, H. The diseases of the endocrine glands. 3. ed.
London, Arnold, 1935, 492 p.

OCTOBER

- Abramson, H. A. Electrokinetic phenomena and their application to biology and medicine.
N. Y., Chemical Catalog Co., 1931, 331 p.
- Andrews, (Mrs.) M. R. (Shipman). A lost commander: Florence Nightingale.
Garden City, Doubleday, 1935, 299 p.
- Atkinson, T. G. Oculo-refractive cyclopedia and dictionary. 2. ed.
Chic., Professional Press, [1934], 384 p.
- Baylis, J. R. Elimination of taste and odor in water.
N. Y., McGraw-Hill, 1935, 392 p.
- Beck, A. C. Obstetrical practice.
Balt., Williams, 1935, 702 p.
- Beer, E. Tumors of the urinary bladder.
Balt., Wood, 1935, 166 p.
- Beesly, L. & Johnston, T. B. A manual of surgical anatomy. 4. ed.
N. Y., Oxford Univ. Press, [1935], 717 p.
- Bull, H. C. H. X-ray interpretation.
London, Milford, 1935, 382 p.
- Carrel, A. Man, the unknown.
N. Y., Harper, 1935, 346 p.
- Commonwealth Fund. Division of Health Studies. Recording of local health work.
N. Y., Commonwealth Fund, 1935, 275 p.
- Diseases (The) of children (Pfaundler and Schlossmann). [4. ed.]
Phil., Lippincott, [1935], 5v.
- Eusterman, G. B. & Balfour, D. C. The stomach and duodenum.
Phil., Saunders, 1935, 958 p.
- Faber, K. H. Gastritis and its consequences.
London, Milford, [1935], 119 p.
- Franklin, E. C. The nitrogen system of compounds.
N. Y., Reinhold, 1935, 339 p.
- Handbook of therapy. Edited by M. Fishbein. 10. ed.
Chic., American Med. Assoc., 1935, 765 p.
- Heaton, C. E. Modern motherhood.
N. Y., Farrar, [1935], 271 p.
- Huntley, K. E. Financial trends in organized work in New York City.
N. Y., Welfare Council, 1935, 330 p.
- Johnston, T. B. A synopsis of regional anatomy. 3. ed.
Phil., Lea, 1935, 460 p.
- Joslin, E. P. The treatment of diabetes mellitus. 5. ed.
Phil., Lea, 1935, 620 p.
- Kennedy, A. J.; Farra, K. [et al.]. Social settlements in New York City.
[N. Y.], Welfare Council, 1935, 599 p.

- Kessler, H. H. The crippled and the disabled.
N. Y., Columbia Univ. Press, 1935, 337 p.
- Knowles, F. C. Diseases of the skin. 3. ed.
Phil., Lea, 1935, 640 p.
- Kovács, R. Electrotherapy and light therapy. 2. ed.
Phil., Lea, 1935, 696 p.
- Lukis, D. H. Problems of anaesthesia in general practice.
London, Hodder, 1935, 158 p.
- Marshall, C. S. An introduction to human anatomy.
Phil., Saunders, 1935, 385 p.
- Novak, E. The woman asks the doctor.
Balt., Williams, 1935, 189 p.
- Obrig, T. E. Modern ophthalmic lenses and optical glass.
N. Y., [Author], 1935, 323 p.
- Palmer, B. B. Paying through the teeth.
N. Y., Vanguard Press, [1935], 297 p.
- Pearson, W. J. & Wyllie, W. G. Recent advances in diseases of children. 3. ed.
London, Churchill, 1935, 566 p.
- Perla, D. & Marmorston, J. The spleen and resistance.
Balt., Williams, 1935, 170 p.
- Pickworth, F. A. Chronic nasal sinusitis and its relation to mental disorder.
London, Lewis, 1935, 156 p.
- Reed, R. The illegitimate family in New York City.
[N. Y.], Welfare Council, 1934, 385 p.
- Rettger, L. F.; Levy, M. N.; Weinstein, L. [et al.]. Lactobacillus acidophilus and its therapeutic application.
New Haven, Yale Univ. Press, 1935, 203 p.
- Rice, T. B. A textbook of bacteriology.
Phil., Saunders, 1935, 551 p.
- de Rivas, D. & de Rivas, C. T. Clinical parasitology and tropical medicine.
Phil., Lea, 1935, 367 p.
- Rubin, H. H. The glands of life.
N. Y., Bellaire, [1935], 164 p.
- Schilder, P. The image and appearance of the human body.
London, Paul, 1935, 353 p.
- Scritti medici in onore di R. Jemma.
[Milano, Sormani], 1934, 2v.
- Speed, K. A text-book of fractures and dislocations. 3. ed.
Phil., Lea, 1935, 1000 p.
- Whiting, M. H. Ophthalmic nursing. 2. ed.
London, Churchill, 1935, 191 p.
- Zilboorg, G. The medical man and the witch during the Renaissance.
Balt., Johns Hopkins Press, 1935, 215 p.

PROCEEDINGS OF ACADEMY MEETINGS

OCTOBER

STATED MEETINGS

SPECIAL NOTICE

There was no Stated Meeting of the Academy on October 3.

The next Stated Meeting (Harvey Society) was that of October 17.

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

October 17

THE FIRST HARVEY LECTURE, "The Proteins and Their Enzymic Degradation," Max Bergmann, Member of the Rockefeller Institute for Medical Research.

SECTION MEETINGS

SECTION OF DERMATOLOGY AND SYPHILIOLOGY—October 1

- I. READING OF THE MINUTES.
- II. PRESENTATION OF MISCELLANEOUS CASES.
- III. DISCUSSION OF SELECTED CASES.
- IV. EXECUTIVE SESSION—Examination of cases is limited to members and their invited guests.

SECTION OF SURGERY—October 4

- I. READING OF THE MINUTES.
- II. PRESENTATION OF CASES—a. 1. A compound depressed fracture of the skull of a child with almost instantaneous onset of Jacksonian seizures; 2. The therapeutic injection of air for the relief of longstanding symptoms following skull fracture; a case with surprising result, Howard Patterson; b. Cases illustrating the papers of the evening, Byron Stookey, Edwin G. Ramsdell; Discussion by Ellsworth Eliot.
- III. PAPERS OF THE EVENING—a. The diagnosis and management of spinal cord injuries, Byron Stookey; Discussion by C. R. Murray, J. E. J. King. b. Skull fractures, a study of 100 consecutive cases, Edwin G. Ramsdell; Discussion by Frederic W. Bancroft, S. Bernard Wortis, Foster Kennedy, C. Hirsch, C. R. Murray.
- IV. GENERAL DISCUSSION.
- V. EXECUTIVE SESSION.

SECTION OF NEUROLOGY AND PSYCHIATRY—October 8

- I. PRESENTATION OF CASES—a. Metastatic melanoma involving the nervous system, Herman Wortis (by invitation), S. Bernard Wortis; Discussion, Foster Kennedy; b. A case of neuromyelitis optica, E. D. Friedman; Discussion, Israel Wechsler, Marcus Neustaedter, Foster Kennedy, S. B. Wortis, A. M. Rabiner.
- II. PAPERS OF THE EVENING—a. The effect of experimental lesions of the superior cerebellar peduncle in macacus rhesus monkeys, Armando Ferraro, S. E. Barrera (by invitation); Discussion, Henry Alsop Riley, Kurt Goldstein; b. The treatment of general paralysis by combined electropyraxia and tryparsamide, L. E. Hinsie, J. R. Blalock (by invitation).

SECTION OF PEDIATRICS

The regular October meeting of the Section of Pediatrics was not held.

SECTION OF MEDICINE—October 15

- I. READING OF THE MINUTES.
- II. The present status of immunization in pertussis and poliomyelitis, William H. Park (45 minutes); Discussion by, Thomas E. Waldie (5 minutes), M. Brody (5 minutes) (by invitation).

- III. Meningitis in man caused by a filterable virus, Thomas M. Rivers and T. P. McNair Scott (45 minutes) (by invitation); Discussion by, Harold G. Wolff (5 minutes) (by invitation).

SECTION OF GENITO-URINARY SURGERY—October 16

I. READING OF THE MINUTES.

- II. PRESENTATION OF CASES—a. Diversion of the urinary stream (Folsom) in a case of carcinoma of the bladder, John W. Draper (by invitation); b. Successful surgical treatment of one case of dichloride anuria, William R. Delzell.
- III. PAPER OF THE EVENING—a. Chemical nephrosis, Leon Herman (by invitation); Discussion, Alexander Gettler, Thomas A. Gonzales, Orrin S. Wightman, George F. Cahill, Lewis T. Mann, Edward C. Brenner, Irving Simons.

COMBINED MEETING OF THE SECTION OF OTOLARYNGOLOGY AND THE NEW YORK ROENTGEN SOCIETY—October 16

- PAPER OF THE EVENING—Roentgen therapy of epitheliomas of the tonsillar region, hypopharynx and larynx. (An extension of observations reported before the American Roentgen Ray Society in 1931.) Henri Coutard, Chief of the Department of Roentgen Therapy for Cancer, Radium Institute of the University of Paris (Curie Institute); Discussion by, Maurice Lenz, William Harris, James Ewing, Francis Carter Wood, Robert E. Buckley, Charles J. Imperatori, Henry B. Orton.

Due to the length of the program, it was not feasible to invite open discussion.

SECTION OF ORTHOPEDIC SURGERY—October 18

I. READING OF THE MINUTES.

- II. PAPERS OF THE EVENING—a. Osteomyelitis, Abraham O. Wilensky; b. The time for operation in acute osteomyelitis, Paul Colonna; c. Bacteriophage in osteomyelitis, George L. Inge (by invitation); d. Rationale and results of maggot therapy in chronic osteomyelitis, Joseph Buchman.

SECTION OF OPHTHALMOLOGY—October 21

The Section decided to forego its October meeting in favor of the Graduate Fortnight. The program of the Graduate Fortnight for Monday evening, October 21, has been arranged by courtesy of the Section.

SECTION OF OBSTETRICS AND GYNECOLOGY—October 22

The Section decided to forego its October meeting in favor of the Graduate Fortnight. The program of the Graduate Fortnight for Tuesday evening, October 22, has been arranged by courtesy of the Section.

NEW YORK PATHOLOGICAL SOCIETY *in affiliation with* THE NEW YORK ACADEMY OF MEDICINE

There was no meeting of the New York Pathological Society in October, as the Graduate Fortnight of the Academy of Medicine was given during a period including the date of the regular meeting.

NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE

October 16

- I. Metabolism of bromobenzene in growing dogs and mice maintained on an adequate diet, J. A. Stekol.
- II. Effect of anterior hypophysis emulsion on natural resistance of hypophysectomized and normal rats to histamine poisoning, D. Perla.
- III. Effect of Vitamin A on proliferation of fibroblasts, Lillian E. Baker (Introduced by T. M. Rivers).
- IV. Influence of certain dye-stuffs on fermentation and respiration of yeast extract, L. Michaelis, C. V. Smythe.

- V. Experiments on purification of bacteriophage, and a respiratory pigment in *Escherichia coli communis*, K. Meyer, R. Thompson, D. Khorazo, J. W. Palmer.
- VI. Effectiveness of the Shope papilloma virus in various American rabbits, J. W. Beard, Peyton Rous.
- VII. Certain factors determining the course of virus induced tumors, John G. Kidd, Peyton Rous, J. W. Beard.
- VIII. Changes in preparation of type specific polysaccharides of pneumococcus necessitated by a quantitative study of precipitation in rabbit antisera, M. Heidelberger, F. E. Kendall, H. W. Scherp.
- IX. Agglutination and precipitation reactions between hemolytic streptococci of Groups A through G (Lancefield) and sera of patients with rheumatoid arthritis, C. McEwen, H. Chasis, R. C. Alexander (Introduced by E. P. Ralli).

DEATHS OF FELLOWS OF THE ACADEMY

CAILLE, AUGUSTUS, Ph.G., M.D., 121 East 60th Street, New York City; graduated from the New York College of Pharmacy in 1873 and from the medical schools of the Universities of Wurzburg, Germany, 1877, and Columbia, 1881; elected a Fellow of the Academy, April 2, 1885; died October 10, 1935. Dr. Caillé was consulting physician at Post-Graduate Hospital and for thirty-five years, from 1888 to 1923, he was Professor of Medicine and Children's Diseases at the New York Post-Graduate Medical School and Hospital. He was Consulting Physician at Lenox Hill Hospital where he had been on the staff for fifty years. He was a member of the County and State Medical Societies, and a Fellow of the American College of Physicians and the American Medical Association. He was a member and a former president of the American Pediatric Society.

WHITE, JOHN BLAKE, M.D., 164 East 72nd Street, New York City; graduated from the College of Physicians and Surgeons in 1874; elected a Fellow of the Academy June 1, 1882; died November 4, 1935. Dr. White was a member of the County and State Medical Societies, the American Therapeutic Association, the American Public Health Association, and a Fellow of the American Medical Association. At the time of his death he was consulting physician at the Whitefield Hospital, Littleton, New Hampshire.

THE GRADUATE FORTNIGHT OF 1935

In January the Committee on Medical Education chose 'Diseases of the Respiratory Tract' as the general subject for the Eighth Annual Graduate Fortnight. A Subcommittee was appointed and the dates were set as October 21st to November 2nd. It was decided to present the same features as in previous years, that is, evening meetings to be held at the Academy, afternoon clinics to be held in selected hospitals (eighteen being invited to participate), and an exhibit. A director of the exhibit was appointed and a Committee to assist him. A Committee on Therapeutics was also appointed. A registration fee of \$3.00 was decided upon.

Two speakers for each evening meeting were invited and were asked to limit their talks to about forty minutes each, in order that the meetings might be concluded by ten o'clock. Representatives of hospitals formed a Committee on Clinics and met several times with the Subcommittee to arrange and coordinate clinical programs.

In April the Council approved the publication of the papers to be presented at the evening meetings and W. B. Saunders Company was engaged to bring out the volume.

Publicity

A preliminary announcement, with return post card attached, was mailed to over twenty-one thousand registered physicians living within a radius of one hundred miles of New York City. Reading notices in the form of releases were sent to most of the important medical journals of the country. The complete program was printed in June and mailing was begun the latter part of the month. Three thousand four hundred and ninety-five requests were received for copies of the complete program.

Registration and Ticket Distribution

A total of six hundred and fifty-eight physicians registered for the Fortnight and were issued general admission tickets. These registrants came from twenty-six states and five foreign countries. About two-thirds of them came from New York City. Fellows and Members of the Academy were issued admission cards without charge.

Attendance at evening meetings averaged about six hundred and fifty. At two of the meetings there was an attendance of over nine hundred. The smallest attendance was four hundred and twenty-three.

The afternoon clinics were very well attended.

The exhibit of this year was larger and appeared to be better attended than that of any previous Graduate Fortnight. To visit the exhibit no tickets were required.

THE GRADUATE FORTNIGHT OF 1935

REGISTRATION—TOTAL 658

From New York State—494

Manhattan	252	Bronx	77
Brooklyn	58	Queens	28
		Richmond	7

New York commuting area (25-mile radius), 17; Up-State New York, 55.

From New Jersey—84

Commuting area (25-mile radius), 74; other parts, 10.

From 31 Other States and Countries—80

Arkansas	1	North Carolina	1
California	2	Ohio	2
Connecticut	15	Pennsylvania	14
District of Columbia ...	1	Rhode Island	1
Florida	2	Tennessee	1
Illinois	4	Texas	1
Indiana	3	Virginia	4
Iowa	1	Washington	1
Kansas	1	West Virginia	1
Louisiana	2	Wisconsin	4
Maine	1		—
Massachusetts	1	Puerto Rico	3
Michigan	1	Canada	4
Minnesota	1	Cuba	3
Mississippi	1	Belgium	1
Nebraska	1	South Australia	1

OFFICERS OF SECTIONS AND AFFILIATED SOCIETIES, 1935-36

<i>Dermatology and Syphilology, 1st Tuesday</i>		
Chairman		<i>Secretary</i>
MAX SCHEER 509 Madison Avenue		FRANK C. COMBES, JR. 80 West 40 Street
<i>Surgery, 1st Friday</i>		
CONDICT W. CUTLER, JR. 667 Madison Avenue		WILLIAM F. MACFEE 1107 Fifth Avenue
<i>Neurology and Psychiatry, 2nd Tuesday</i>		
LEON H. CORNWALL 30 East 76 Street		ABRAHAM A. BRILL 1 West 70 Street
<i>Historical and Cultural Medicine</i>		
2nd Wednesday of November, January, March and May		
JEROME P. WEBSTER 620 West 163 Street		REGINALD BURBANK 6 East 78 Street
<i>Pediatrics, 2nd Thursday</i>		
BELA SCHICK 17 East 84 Street		ALEXANDER T. MARTIN 107 East 85 Street
<i>Ophthalmology, 3rd Monday</i>		
JOHN H. DUNNINGTON 30 West 59 Street		LEGRAND H. HARDY 30 East 40 Street
<i>Medicine, 3rd Tuesday</i>		
PAUL REZNICKOFF 525 East 68 Street		CLARENCE E. DE LA CHAPELLE 140 East 54 Street
<i>Genito-Urinary Surgery, 3rd Wednesday</i>		
JOSEPH A. HYAMS 78 East 79 Street		ROY B. HENLINE 901 Lexington Avenue
<i>Otolaryngology, 3rd Wednesday</i>		
WESTLEY M. HUNT 33 East 68 Street		CHARLES W. DEPPING 19 West 54 Street
<i>Orthopedic Surgery, 3rd Friday</i>		
WALKER E. SWIFT 115 East 61 Street		NICHOLAS S. RANSOHOFF 1100 Park Avenue
<i>Obstetrics and Gynecology, 4th Tuesday</i>		
WALTER B. MOUNT 21 Plymouth St., Montclair, N. J.		ARTHUR M. REICH 141 West 77 Street
AFFILIATED SOCIETIES		
<i>New York Roentgen Society, 3rd Monday</i>		
President		<i>Secretary</i>
RAMSAY SPILLMAN 115 East 61 Street		E. F. MERRILL 30 West 59 Street
<i>Society for Experimental Biology and Medicine, 3rd Wednesday</i>		
E. L. OPIE 1300 York Avenue		A. J. GOLDFARB City College, Convent Ave. & 139 St.
<i>Harvey Society, 3rd Thursday</i>		
R. KEITH CANNAN Bellevue Hospital		RANDOLPH WEST 622 W. 168 Street
<i>New York Pathological Society, 4th Thursday</i>		
WM. C. VON GLAHN 622 West 168 Street		IRVING GRAEF Bellevue Hospital

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Anniversary Discourse

ASPECTS OF A PHILOSOPHY OF GOVERNMENT IN A SICK WORLD*

MR. WALTER LIPPmann

When Dr. Hartwell and Dr. Pool invited me to speak here this evening, they suggested that I might talk upon some aspects of the relation between the medical profession and the community. They supplied me with a collection of pamphlets and reports and reprinted addresses dealing with medicine in its public relations. I read them diligently. But the more I thought about the questions at issue, the more uneasy I became. For I realized that I did not really understand them and that all I could hope to do was to enlighten you about the extent of my own ignorance. At this point I began to wonder wistfully whether the Ethiopian war might not require my presence in London or Geneva or Addis Ababa tonight; for this seemed a not wholly unconvincing way of letting the Academy of Medicine solve its problems without my assistance.

I am making this confession of embarrassment and cowardice because it enables me to boast about my sudden discovery of a triumphant solution of this predicament. If I were a politician, I said to myself, I should, of course, have to act as if I knew the answer to every problem: what politician has ever admitted that he did not know the answers to anything? Perhaps if I were a commentator on current affairs I could not escape expressing an opinion

* Delivered before The New York Academy of Medicine, December 19, 1935.

even if I were not entitled to an opinion. But surely, I thought, in a gathering of medical men it will be easy to say candidly that there are aches and ills which flesh is heir to that even the best physician does not understand and cannot cure. After that I felt at ease. It is a great relief to come from the world of public affairs, where no one dares to admit that he does not know, where no one ever admits that he has made a mistake, where no one ever admits that he is puzzled, into a world where it is respectable and honorable and safe to put aside the pretension of infallibility and of omniscience.

I should like to discuss an aspect of the philosophy of government in a disordered world. Philosophy is perhaps too pretentious a name: what I have in mind is an attitude towards government which, when it becomes articulate and explicit, may be dignified as a philosophy.

In the realm of government, whether a man is simply an interested citizen or an active politician, or a responsible official, or a student and thinker, the subject matter is complex, it transcends his personal observation and experience, it comprises an extraordinarily large number of intricately related variable elements. In order to think about politics at all, in order to make public affairs comprehensible to the human mind, men have to create for themselves some kind of mental image, some sort of model, some hypothetical pattern which is simpler and more familiar than the reality which William James used to call the buzzing, blooming confusion of the actual world. It is beyond the power of ordinary minds—I am tempted to say that it is beyond the power of any mind—to deal continually and effectively with the data of experience in all their raw, heterogeneous fullness.

At different times in the course of history men have used different images to represent to themselves the social order in which they live. One of the oldest and most persistent of these images is derived from the patriarchal family; the relation between the ruler and his subjects is conceived as similar to that between the patriarch and his children.

Then there is the image derived from war: the ruler's relation to his subjects is conceived as the relation between the chieftain and his warriors. This, incidentally, is a social image which has recently had a spectacular recurrence in the fascist states of Europe. Again and again, from the time of the Graeco-Roman thinkers, men have at certain times conceived society as a body politic in which each class, each rank, was an essential member. Usually the current image has been an imitative reflection of the accepted or dominant science of the age. Thus in the Eighteenth Century, the profound impression made upon men by the Newtonian conception of the physical world was carried over into politics, and men conceived society as a system of forces. Our own constitutional system was devised by men who had the daring to conceive a federal republic in which the states would remain as distinct as the separate planets and as unified as the solar system. In the Nineteenth Century, the Darwinian imagery took possession of many political thinkers: economic competition and the imperialist competition of national states were regarded as illustrations of the struggle for existence of a surplus population in an insufficient environment and of the survival of those most fitted to survive.

Now in our own day a different image has taken possession of many influential minds. Let us call it the image of the statesman as engineer. It is not hard to account for its popularity and persuasiveness. The most obvious triumphs of modern man, those which are most easily appreciated, are his great buildings, his great ships, his great machines, his great tunnels, dams, canals. Mankind has been profoundly impressed with the contrast between the efficiency of these engineering works as compared with the inefficiency of statesmen, of financiers, and of business men. The engineer, it seems, is able to achieve what he sets out to achieve. He can plan and he can carry out his plan. He knows what he is doing and he does it.

So the idea took hold that society might be run by engineers, might be deliberately constructed according to a plan and then operated as efficiently as a great machine.

have smelt, have felt, have perceived what it is and what to do. It used to be said that you did not have to be in the ring with Jack Dempsey for fifteen rounds in order to learn that he was a champion. Likewise, the master of a subject, whether he is a carpenter or the rider of a horse, a diagnostician or a surgeon, will quickly disclose in the inevitable emergencies of any human activity whether he possesses that intimate feeling, that flair, that uncalculated aptitude which distinguishes the first-rater from the second-rater.

Now among public affairs as elsewhere, since everything cannot be reasoned out *a priori* in each emergency, it is of the utmost importance that the political tradition of a country should predispose men towards a true and reliable sense of how living men in a living society behave. That is why the dominant imagery is so important.

The image of a planned and engineered society has the effect, I believe, of destroying the intuitive feeling for what society actually is and of the sense of touch in dealing with human affairs. The grosser consequences of it are evident enough: in the supreme impertinence with which communist and fascist states treat human beings as if they were animate materials to be fabricated by the dictators; in the ruthlessness with which they cut human nature to the shape they desire and nail together in designs of their own the living spirits of men. This notion that society can be engineered, planned, fabricated as if men were inanimate materials becomes in its extremist manifestations a monstrous blasphemy against life itself. It can also take milder forms which merely produce temporary confusion and inconvenience as in the fantastic attempts, now happily concluded, to write in three or four months some five hundred codes for the detailed conduct of all business throughout continental America.

The man who approaches public life with a feeling for living organisms will not fall into the illusion of thinking he can plan or fabricate or engineer a human society. He will have the more modest aim of defending it against the

invasion of its enemies and of assisting it to maintain its own balance.

Remembering that a society is an association of living persons, and not an arrangement of inanimate materials, he will never imagine that he can impose upon those living persons and their descendants his private preferences. He will recognize that the function of government is not to decide how men shall live, what kind of men they shall be, what they shall spend their energies upon. Government cannot direct the life of a society. Government cannot shape the destiny of the human race.

There are some who think that government should use all its powers of coercion to make the social order correspond with their own ideal of a nobler and more satisfying social order. But this is as if a doctor dealt with a patient on the assumption that he must use drastic medicine if he finds that his patient is not as strong as Hercules, as beautiful as Apollo, and as wise as Zeus. He would be an absurd doctor. The sound physician, I take it, is not attempting to make a superman out of his patient. He takes measures to protect him against the invasion of hostile bodies. He cultivates habits which improve his resistance. He intervenes with medicines and surgery when he thinks he can assist the patient in recovering his own equilibrium. Always, if I understand the faith of the physician, he regards himself not as the creator, designer and dictator of the nature of man but as the servant and the ally of nature. There are times to be sure when his patient is prostrate and the doctor must be the master of his whole regime. But even in these times, the good doctor will be continually seeking for ways, not to make a new man of his patient but to encourage those recuperative powers which may at last enable the patient to walk again on his own feet.

There is a vast difference between those who, as engineers dealing with inanimate materials, can dictate to nature and those who, as physicians dealing with living organisms, must respect nature and assist her. My thesis is that statesmen had better think of themselves as physicians who assist

society than as engineers who plan and fabricate it. They will understand these problems better if they realize that society has not been invented or constructed by any man or any set of men but is in fact the result of the infinitely complex adaptations by innumerable persons through countless generations. Its destiny is beyond the power of the human mind to imagine it. Its reality is complex beyond the mind's power to grasp it. Its energies are beyond the power of any men to direct it. Society can be defended. Its adjustments can be facilitated. Its various purposes can be clarified, enlightened, and accommodated. Its aches and pains can in some measure be relieved. But society is not and never will be a machine that can be designed, can be assembled, can be operated by those who happen to sit in the seats of authority.

To know this, to realize the ultimate limitations of government, and to abide by them, is to have that necessary humility which, though for the moment it is at a discount in many parts of the globe, is nevertheless the beginning of wisdom. Without it men will use political power for ends that government cannot realize, and in the vanity of their delusions fall into all manner of cruelty, disorder, and waste. They will have forgotten to respect the nature of living things, and in their ambition to be as gods among men they will affront the living god. They will not have learned that those who would be more than human end by being less than human.



JAMES DE BERTY TRUDEAU: ARTIST, SOLDIER, PHYSICIAN*

Examples of His Work

ARCHIBALD MALLOCH

Miss Mary Hall Sayre, daughter of a founder of the Academy, the celebrated orthopedic surgeon, Lewis Albert Sayre (1820-1900), and sister of Dr. Reginald Hall Sayre (1859-1929), has recently made some important gifts to The New York Academy of Medicine. By far the most interesting of these are eight small plaster busts ranging from seven to fourteen inches in height, most of them in caricature, and three bas-reliefs in bronze, about seven inches in diameter. All of them are of New York doctors who flourished seventy or eighty years ago. These figures are well remembered by patients who consulted Dr. Sayre or his son. They are now discolored; the prominence of foreheads and other parts of the statuettes are darkened with dust and age, while the hollows and deeper lines are light. Hence they are a little like negative pictures, and the difficulty of making good photographs is obvious. The statuettes are all signed "Trudeau" except two, but these are undoubtedly by him also.

Now who was "Trudeau"? Miss Sayre tells us he was the father of Dr. Edward Livingston Trudeau (1848-1915), and adds that she thought there was a reference in the latter's *Autobiography* (Philadelphia and New York, 1916) to these figures. The following passages are taken from pages 8-10 of that book:

I have a markedly medical ancestry. My father, Dr. James Trudeau, was a member of a well-known New Orleans family, and my mother's father, Dr.

* Read before the Charaka Club, February 18, 1931. Also, in briefer form, American Association of the History of Medicine, Ninth Annual Meeting, Washington, D. C., May 8, 1933.

Reprinted from the *Proceedings of the Charaka Club*, 1935, Vol. VIII, by permission of Columbia University Press.

François Eloi Berger, was a French physician whose ancestors were physicians for many generations, as far back as they could be traced. . . . I can remember little about my father. I know that during the great Civil War he was an officer in the Southern Army, and for a time had charge of Island No. 10; and that he was wounded and brought back to New Orleans, where he partly recovered and practised his profession for a few years before his death. Before the war he married a Miss Marie Bringier, who belonged to a well-known New Orleans family, and who survived him, dying in Baltimore in 1909.

After her death, Miss Félicie Bringier, her sister, sent me a large oil painting of my father in Indian hunting costume, which she said was painted in the early Forties by John J. Audubon. The distinguished naturalist was a great friend of my father's, who accompanied him on many of his scientific expeditions, and went with him on the Fremont expedition to the Rocky Mountains in 1841. Miss Bringier states in her letters to me that my father often helped Audubon with the anatomy of his ornithology work, and drew illustrations of birds and eggs for him.

My father not only drew and painted well, but he had a marked talent for modelling in clay and making bas-reliefs, and I have in my possession some of his work cast in bronze. I remember my grandfather, Dr. Berger, often saying that my father's talent for caricature had done him an immeasurable amount of harm professionally in New York, for he made a set of statuette caricatures of the medical faculty, which were so well done and such telling caricatures that many of the gentlemen never forgave him.

The love of wild nature and of hunting was a real passion with my father—a passion which ruined his professional career in New Orleans, for he was constantly absent on hunting expeditions. As mentioned in Miss Bringier's letters, in 1841 he spent over two years with the Osage Indians, who presented him with the buckskin suit in which he was arrayed when Audubon on his return painted the portrait which is now in my possession. This could not have helped him retain his practice.

Fortunately this account may be supplemented by information given in the *Times-Democrat*, New Orleans, for August 21 and 28, 1892, in articles (xxvii and xxviii) on "Louisiana Families" written by Charles Patton Dimitry.* He says that for quite six generations the Trudeau family was "of approved merit to the Colony and State" of Louisiana. The old way of spelling the name of Trudo (Latin "I thrust"), and battering-rams appear on the Trudeau coat-

* I wish to thank Mr. Robert J. Usher, Librarian of the Howard Memorial Library, New Orleans, for a résumé and photostats of these. In one of these articles a drawing of a medallion of James Trudeau's brother Zénon is reproduced.



FIG. I

JAMES DE BERTY TRUDEAU
Painting by Audubon (John Woodhouse Audubon?)

of-arms. Many in past generations signed themselves Trudeau de Longueil. The first of the family to come down to Louisiana from Canada was Jean Trudeau. This was in the time of Bienville (1680-1768), and under both the French and Spanish domination, Jean Trudeau was Interpreter General and Indian Agent for the Choctaw and Chickasaw Indians.

Dimitry writes that James Trudeau was born September 14, 1817, not stating where, but probably it was in Jefferson Parish, Louisiana, where his father lived. He was sent to France to be educated at the College of Louis-le-Grand, but on account of an illness, he went to a military school in Switzerland. Later he began the study of medicine in Paris, that is, before 1835, when he returned to study at Philadelphia under Dr. Joseph Pancoast (1805-82). At the end of a *Catalogue of the Medical Graduates of the University of Pennsylvania; with an Historical Sketch of the Origin, Progress, and Present State of the Medical Department*, Philadelphia, 1836, is an "Additional Catalogue" of a few pages, dated "May, 1837." This lists "Trudeau, James, Louisiana" as having received the degree of Doctor of Medicine "at the Commencement in March, 1837." The subject of his essay was Apoplexy. He came to practice in New York, and married Miss Cephise Berger, daughter of the French doctor, François Eloi Berger. Edward Livingston Trudeau was born in 1848, the third of the family.

Figure 1 is from a photograph of the painting in Indian costume of James Trudeau "by Audubon"; it will be remembered that Edward Livingston Trudeau speaks of their expeditions together as naturalists. The portrait is now at Saranac Lake. Mr. Stanley Arthur, an authority on Audubon, has proved that the painting is not by John James Audubon, but by John Woodhouse Audubon, the younger son of the naturalist, painted in 1841, two years before the Missouri River exploration trip. J. J. Audubon writes to his elder son Victor, February 11, 1841:

John is now to paint the Portraits of old Mr. and Mrs. White. He has painted a good picture of Mrs. Gay's husband, and one of Trudeau in

Indian Dress, as well as his "old Dad" sitting in the Wilds of America admiring the Nature around him, with a *Dog Companion*, lying at "his" feet. I think you will be pleased with these.*

Mr. Arthur states that Audubon, in 1838, named a species of tern, secured by Trudeau at Great Egg Harbor, N. J., *Sterna trudeaui*, and it is now called "Trudeau's Tern." Also, Mr. Arthur has not confirmed the statement that Trudeau made a number of bird portraits for Audubon, although "the doctor was an ardent collector."

Trudeau is on the "List of Founders" [of the New York Academy of Medicine, (1847)], a manuscript written by Dr. S. S. Purple, a true benefactor of the Academy. It was while he was in New York that Trudeau did the statuettes and bas-reliefs or medallions. Figure 2 is a reproduction of a bas-relief Trudeau executed of himself inscribed "J. DE. BERTY. TRUDEAU. MED. ET. SCIENT. DOCTOR. NOV. EBORAC. A.D. 1849." The other, figure 3, is now in the possession of his grandson, Dr. F. B. Trudeau, at Saranac Lake.* We have at the Academy the catalogue of *The Entire Professional Library of Dr. James Trudeau . . . also a Fine Assortment of Medical Instruments, &c.*; this collection was sold at auction by John Keesee on March 8, 1852. One is struck with the proportion of French books in the list, and, in view of what we shall write later on, it is of interest that Trudeau had a copy of *Woman and Her Diseases* [the first edition was published in 1846] by Edward H. Dixon. Trudeau evidently stayed in New York and did without his books until at least 1858, for one statuette bears that date. Edward Livingston Trudeau writes of his father (*Autobiography*, pp. 8-9) :

He returned to New Orleans with my sister, and when three years old I went abroad with my mother, my brother and grandparents. . . . While we were abroad my mother obtained a divorce, and married a French officer, a Captain F. E. Chuffart.

* This letter, which the writer is permitted to quote, was furnished to Mr. Arthur by Mr. Victor Morris Tyler, New Haven, a grandson of Victor Audubon.

* I am indebted to Dr. Trudeau for permission to publish photographs of this and other bas-reliefs, bronze statuettes, and the Audubon painting of Trudeau.

We can scarcely believe that he left New York because his statuettes made him unpopular, as has been said, but we find that in 1860 James Trudeau "of New Orleans" wrote an article "On Granulations of the Lining Membrane of the Uterine Cavity" which was published in *The New Orleans Medical and Surgical Journal*, 1860, XVII, 51-55, and therefore he must have been settled in the South again by that time.

In 1861 Dr. James Trudeau was General commanding the Louisiana Legion at New Orleans, and at the outbreak of the Civil War he wrote a treatise, *Considérations sur la défense de l'état de la Louisiane, et sur l'organisation de ses milices*, Nouvelle-Orleans, 1861, a paper-covered book of eighty-two pages (see figure 7).** He was Brigadier General of artillery with the Confederate Army, and was severely wounded at the battle of Shiloh, and arranged the defenses of Island No. 10. He fought at Madrid Bend, and was taken prisoner in October, 1864.† According to Mr. Dimitry, Trudeau married Miss Louise (not Marie) Bringier in 1863. Dr. Trudeau wrote many articles in the early numbers of the short-lived *Medical Review according to the Dosimetric Method of Dr. Ad. Burggraeve*, New Orleans 1882-84, Vols. I—III, of which he was the chief editor, "the matter relating to the Veterinary Sciences being under the supervision of Dr. J. Morice, Veterinary Surgeon." This periodical is in the Army Medical Library. Apparently he continued to live on in New Orleans and died there May 25, 1887.

In looking up about Trudeau's first wife it seemed possible that her father, Dr. François Eloi Berger, might have published some medical papers. It was found that a "Franc. Berger, de New-Yorck, (Etats-Unis)" wrote a "Disserta-

** I am indebted to Mr. Robert J. Usher, Librarian of the Howard Memorial Library, New Orleans, for a photostat of this.

† See *War of the Rebellion, a Compilation of the Official Records*, in which all references to Trudeau may be found in the general index volume. In Series 1, Vol. VII, there are letters from Maj.-Gen. Leonidas Polk praising Trudeau, and in Vol. LII of the same series, are several good letters from Trudeau to Polk.



FIG. 2
James de Berty Trudeau
Bronze bas-relief Trudeau executed
of himself.



FIG. 3
James de Berty Trudeau
Bronze bas-relief Trudeau executed
of himself.

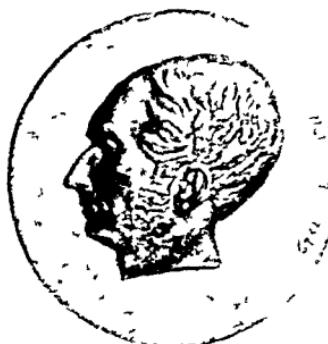


FIG. 4
Dr. François Eloi Berger
Bronze bas-relief by Trudeau



FIG. 5
Dr. François Eloi Berger
Bronze bust by Trudeau



FIG. 6
Valentine Mott
Plaster statuette by Trudeau

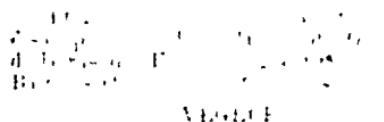
tion sur L'ophthalmie," *Théses de Paris*, 1812, no. 172, 18 pp. There can be little doubt but that this Berger was Dr. James Trudeau's father-in-law. The dedication is to "Archibald Bruce, Professor de Minéralogie à l'Université de New-York" and to "F. J. Double, Docteur en Médecine." Fortunately a bronze bas-relief, done in 1849, and a bronze bust (seven and one-half inches high), done in 1851 (figures 4 and 5) are in the possession of his great grandson, Dr. Francis B. Trudeau, at Saranac Lake, New York in the Trudeau Collection. Berger's name appears in the list of founders of the New York Academy of Medicine, 1847. In 1860 he was made a Non-Resident Fellow of the Academy, probably after he had gone back to France with his daughter, Mrs. Trudeau. Berger returned to New York, and died there in the seventy-seventh year of his age, in 1866 or 1867, and Mr. J. Lawrence Aspinwall, grandson of Berger's sister-in-law, kindly tells me he was buried in the Aspinwall family vault at Oak Hill Cemetery, Nyack, New York.

Trudeau's caricature (figure 6) of the famous surgeon Valentine Mott (1785-1865), a founder of the Academy of Medicine, and its president in 1849 and 1857, marked "J. Trudeau 184—" (the last figure cannot be read) must have been a very good one, for Dr. Lewis Albert Sayre used to tell his daughter that Mott held his hands and arms in that way when talking or lecturing. The right forearm and hand are now gone, but after Dr. Sayre's evidence we can be sure that Mott was not playing at "Diabolo" as was facetiously suggested for the "Venus de Milo"! Mott was born at Glen Cove, Oyster Bay, Long Island. After obtaining his M.D. in New York, he studied under Sir Astley Cooper in London, who later said of his pupil: "He has performed more of the great operations than any man living." Mott was Professor of Surgery in Columbia College, Rutgers Medical College, New York, and in the medical department of New York University. His books which had formed "The Valentine Mott Memorial Library" came to the New York Academy of Medicine in 1909.

CONSIDÉRATIONS
 SUR LA
DÉFENSE
 DE L'ÉTAT DE LA LOUISIANE,
 ET SUR
 L'ORGANISATION DE SES MILITAIRES,

Par JAMES TRUDEAU.

GÉNÉRAL COMMANDANT LA LEGION DE LA LOUISIANE



A VENEZUELA



NOUVELLE-ORLÉANS

IMPRIMERIE DE G. LAMARQUE, LIBRAIRE ET ÉDITEUR

1861.

FIG. 7

TITLE-PAGE OF TRUDEAU'S MILITARY WORK

Figure 8 shows the caricature of John Wakefield Francis (1789-1861). It is not inscribed, but is evidently the work of Trudeau. Miss Sayre suggested "Dr. Francis" as the subject—her memory is remarkably good—and the clothes seem too old-fashioned for the son, Dr. Samuel Ward Francis (1835-86). Unfortunately, we cannot find a portrait of the latter. We have a portrait of John W. Francis, Jr. (1832-55), but the caricature is certainly of an older man than he lived to be. At the Academy we have two good painted portraits, and several engraved ones, of Dr. John W. Francis. None show him wearing spectacles, but in one of our paintings he is holding a pair in his hand. Dr. Francis graduated from the College of Physicians and Surgeons in 1811, was a founder of the Academy, its vice president in 1847, and its president in 1848 and again in 1855. After graduation Francis became a partner of his teacher, David Hosack (1769-1835), and shortly afterwards was made Professor of the Institutes of Medicine and Materia Medica at the College of Physicians and Surgeons.

The caricature of Willard Parker (1800-84) (figure 9) has suffered a little, as the tip of the nose has been broken off, but it could be restored easily. He was born at Hillsborough, New Hampshire. The statuette is inscribed "Trudeau, 1848." Parker was given the degree of M.D. by Harvard in 1830, and by the Berkshire Medical Institution in 1831. He was Professor of Surgery at Cincinnati, and at several medical schools in New York, before being appointed to the College of Physicians and Surgeons, Columbia University (1839-69). He was president of the New York Academy of Medicine in 1856.

The caricature of Dr. Lewis Albert Sayre (figure 11) is the only one which was originally black. It is marked "Jas Trudeau 184[8?]." The bas-relief in bronze (figure 10) is inscribed "LVDOVIC. A. SAYRE. MEDICUS. NOV. EBORAC. J. TRUDEAU. 1849." Dr. Sayre graduated A.B. from Transylvania University, Kentucky, in 1839. He was an organizer of Bellevue Hospital Medical College, and was given the chair of orthopedic surgery, the first in the United States. He was a pioneer in several branches of



FIG. 8
John Wakefield Francis
Plaster statuette by Trudeau



FIG. 9
Willard Parker
Plaster statuette by Trudeau

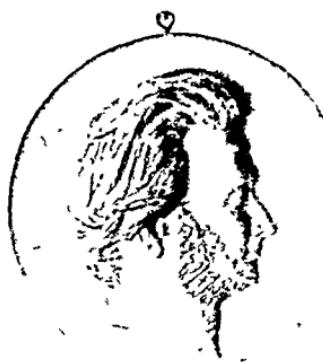


FIG. 10
Lewis Albert Sayre
Bronze bas-relief by Trudeau



FIG. 11
Lewis Albert Sayre
Plaster statuette by Trudeau



FIG. 12
Dr. Alban (?) Goldsmith (né Smith)
Small plaster bust by Trudeau

orthopedic surgery, especially in the treatment of hip disease and clubfoot, so that he was invited to lecture abroad in several different countries.

There is one fact about the life of Dr. Sayre which is probably not widely known. He was born at Bottle Hill, now Madison, Morris County, New Jersey, in 1820, and in 1824 the Marquis de La Fayette visited this country. On his way through Bottle Hill to Morristown he was received under a triumphal arch, and Lewis Sayre, a little boy of four recited a poem of three verses composed by John T. Derthick, the principal of the Academy where Sayre went to school.* Miss Sayre possesses a ribbon badge (worn probably on that day), a photograph of which she kindly gave to the New York Academy of Medicine. Above Gen. La Fayette's picture is printed "Welcome to the land of Liberty," and below it three verses, the first of which runs:

Hail, patriot, statesman, hero, sage!
 Hail, freedom's friend! hail, Gallia's son—
 Whose laurels greener grow in age,
 Plucked by the side of Washington!
 Hail, champion in a holy cause,
 When hostile bands our shores beset;
 Whose valor bade th' oppressor pause—
 Hail, hoary warrior—*La Fayette!*

Miss Sayre was inclined to the opinion that the bust of which figure 12 is a reproduction was of Dr. Middleton Goldsmith (1818-87), as her father corresponded with him after he went to Vermont in 1844 and became Professor of Surgery in the Castleton Medical School. The bust is inscribed "Jas Trudeau 1848," that is, four years after Middleton Goldsmith left New York. Besides, the portrait is that of a man much over thirty. The bust shows some family resemblance to an engraving of Middleton Goldsmith, and might very well be of the father, Dr. Alban Goldsmith (*né* Smith) (1794-1861), who, at the time, would have been about fifty-four years old. Dr. Alban Goldsmith was born

* "Biographical Sketch of Dr. Lewis A. Sayre," reprinted in 1893 from *Contemporary American Biography*. New York, Atlantic Publishing and Engraving Co.



FIG. 13

Dr. Eugene Ramsay Peugnet (?)
Plaster statuette by Trudeau



FIG. 14

Dr. Henry Feltus Quakenbos
Plaster statuette by Trudeau



FIG. 15

Dr. J. B. Pigné (or Pigné-Dupuytren)
Bronze bas-relief by Trudeau



FIG. 16

Bronze Bust of
an Unknown by Trudeau



FIG. 17

Dr. Edward H. Dixon
Plaster statuette by Trudeau

at Danville, Kentucky, was associated with the great Ephraim McDowell, and was Professor of Surgery at the University of Ohio, Cincinnati (1833-37) then he became Professor of Surgery at the College of Physicians and Surgeons, New York, for two sessions, and was succeeded by Willard Parker. James Trudeau must certainly have known the Goldsmiths, as they have a common friend in Audubon. *The Medical Register of New York, New Jersey and Connecticut*, New York, 1888, XXVI, 253, in a notice of Middleton Goldsmith's death, says: "The Goldsmiths were great naturalists, and Middleton assisted the great Audubon in the dissection and classification of some of the birds of America." We have no picture of Dr. Alban Goldsmith for comparison.

Miss Sayre could not be certain, but thought that the caricature (figure 13) was of a doctor whose name was pronounced something like "Peugnet." Dr. Samuel W. Lambert, who has shown a great interest in these statuettes, suggested that the caricature might represent Dr. Eugene Peugnet as he, like some of the others who were caricatured, was a member of the New York Pathological Society (see its *Transactions*, New York, 1876, I, xxv-lii). But no picture of Dr. Peugnet could we find in the Academy. It seemed well worth while to try the *New York City Telephone Directory*, and Mr. Ramsay Peugnet replied to a query that he was a son of Dr. Peugnet, and sent us photographs to compare with the caricature. There can be little doubt that the subject of the caricature is Dr. Eugene Ramsay Peugnet (1837-79). The figure is inscribed "Trudeau," but we cannot make out the subject of the little medallion on the base. Peugnet was born in New York,* was a student of Dr. Willard Parker, and "graduated from the College of Physicians and Surgeons in 1858, his thesis being upon the anatomy of the femoro-tibial articulation." This latter statement is of some interest to us as the caricature shows he had a good grasp of the knee joint,

* *Medical Register of New York, New Jersey, and Connecticut . . . 1880*, New York, 1880, XVIII, 239-40.

for he is holding the knee of an amputated lower extremity in his right hand. Peugnet served in the Civil War as surgeon with the Seventy-first Regiment, New York, and was taken prisoner at the battle of Bull Run. He practiced at Fordham except for a short time in New York City. In 1879, while he was walking beside the Harlem Railroad near West Mount Vernon, he was struck by an engine and died shortly afterwards. He was recognized as a good surgeon. In 1874 he published *The Nature of Gunshot Wounds of the Abdomen, and Their Treatment: Based on a Review of the Case of the Late James Fisk, Jr. in Its Medico-Legal Aspects*, a book of ninety pages about a celebrated murder. This and another paper "Medico-Legal Toxicology" (1873) were read before the Medico-Legal Society of New York. Another paper, read before the Yonkers Medical Association in 1878, "Clinical Notes in Obstetrics and Gynaecology" (reprinted in thirty-four pages from the *Ohio Med. and Surg. Jour.*), shows that he was a careful recorder and a well-educated man.

It has been rather difficult, owing to likeness of names, to distinguish "Peugnet" from "J. B. Pigné Medicus, J. Trudeau, 1849," the subject of the bronze medallion (figure 15). Mr. Frank Place, Senior Reference Librarian of the New York Academy of Medicine, found an article in the *New York Journal of Medicine*, 1848, new series, I, 307-15, "On the Anatomical and Physiological History of Those Affections Which Are Called Inflammatory," written by "J. B. Pigné, Late Curator of the Dupuytren Museum, Ex-Vice-President of the Anatomical Society, Professor of Pathological Anatomy, etc. etc." We thought we were certainly on the right track when we discovered that there was a footnote: "For a translation of the following communication from Prof. Pigné, now a resident in this country, and at present in Louisiana, we are indebted to L. A. Sayre, M.D., Prosector to the Professor of Surgery in the College of Physicians of this city.—Ed. New York Jour. of Med."

For a time we lost him in Louisiana as the southern medical journals seemed to make no mention of him. For-

tunately, an Honorary Fellow of the New York Academy of Medicine, Dr. Rudolph Matas, who lives at New Orleans, when shown the statuettes here on one of his trips North, promised to bear the name "Pigné" in mind. He was as good as his word, and wrote in 1933 that he had come across the name "Pigné-Dupuytren" in Henry Harris' *California's Medical Story . . .*, San Francisco, 1932. Little had we dreamt that our Pigné had gone to California. One book led to another, and now it is possible to tell a few events of his life.

J. B. Pigné was apparently born at Limoges about 1806, and, as a boy, went to Paris, and later studied under his famous uncle Baron Dupuytren. No Paris thesis can be found under his name. He is said to have received a degree from Heidelberg. The catalogue of the New York Academy of Medicine shows that between 1830(?) and 1838 he translated several German books into French, and published a paper or so of his own. We find that in 1843 Pigné was treasurer of the Société Anatomique de Paris, also an editor of its *Bulletin*; and in 1844 he was "Conservateur-adjoint du Musée Dupuytren." He probably worked at Edinburgh for a time as it is said he had an "R.C.S." from there in 1848,* the year before Trudeau executed the medallion of him at New York.

Pigné came over to New York to practice medicine, but apparently left soon after for New Orleans. Being unsuccessful there he returned to New York, and meeting his schoolmate Delmonico, he was persuaded by him to go out to California and look after the latter's gold interests there, in addition to establishing himself in practice. He reached California, via Cape Horn, accompanied by the bed that he had brought from France! In California he was always known as Pigné-Dupuytren. We must not be harsh, but perhaps he thought that the latter name would help him! He settled in San Francisco, built up an extensive practice, and backed financially the Raousset-Boulbon colonization

* *Medical and Surgical Directory of the United States*, New York, 1886, p. 166.

expeditions to Arizona and Mexico. Pigné-Dupuytren married in San Francisco, later settled in Los Angeles in 1874, and died in San Diego in 1886. He wrote two short articles in the *Pacific Medical and Surgical Journal*, Vol. I, 1858, and Vol. XXII, 1879-80.

Miss Sayre was almost certain that the cupid figure (figure 14) was a caricature of a Dr. Quackenbos or Quackenbush. It is inscribed "Trudeau, 1848." This is certainly one of the most amusing of the plaster statuettes. Again we can find no portrait for comparison, but Dr. Henry Feltus Quackenbos (1819-88) is in all probability the doctor in question. The son of Dr. Nicolas I. Quackenbos (d. 1847) who had graduated from Columbia University in 1800, he was born in New York and graduated M.D. in 1841 from the College of Physicians and Surgeons. Then he went to study abroad, and served for a time as an army surgeon in Algiers, and returned in 1845 and assisted Dr. Cheesman. Dr. Quackenbos, a Fellow of the Academy of Medicine:

had a large practice among the dramatic profession, chief among whom as a personal friend he claimed Edwin Forrest, the distinguished tragedian, and was much admired for his wit and powers of repartee by John Brougham and James T. Brady. . . . The last prescription he wrote was for the veteran actor Davidge. He was an exceedingly agreeable companion. . . . He was a great lover of art, and took especial pride in the exhibition of two wonderful statuettes of Demosthenes and Caesar that he obtained at Pompeii. He also possessed a number of original drawings of Gustave Doré, of whom he was a great admirer.*

Surely, knowing these qualities, James Trudeau was justified in giving Dr. Quackenbos wings, and such a light and airy grace. At least we like to think it is Henry Feltus Quackenbos!

Figure 16 is of a small bronze bust now at Saranac Lake. The subject of it is unknown.

Dr. Edward H. Dixon (1808-80) familiarly known as "Scalpel Dixon" (figure 17) must have been an interesting

* *Medical Register of New York, New Jersey and Connecticut*, New York, 1889, XXVII, 281-82.

character. He studied under Valentine Mott and states, "In the year 1830 I was sent forth from that ark of safety, the old Duane Street College"** [Rutgers Medical Faculty of Geneva College, New York]. He practiced in New York, is said to have been quite an able urological surgeon, and invented several instruments. He had a private hospital and gave advice by letter for five dollars. He grew very fond of writing and poking fun at the polypharmacy and other foibles of the medical profession, and of trying to "expose quackery." At the same time he attempted to attract patients. Under the nom de plume of "Scalpel, M.D." he wrote *The Terrible Mysteries of the Ku Klux Klan* (1868). The Academy has no copy of this book. From 1849 to 1860 [twelve volumes] he edited, and we presume wrote nearly all the articles for *The Scalpel: A Journal of Health Adapted to Popular and Professional Reading, and the Exposure of Quackery*. The motto of the journal was "Who Shall Guard the Shepherds? (Quis custodiet ipsos custodes?)" Dixon wrote well, and one of the best things in the whole series is his review and criticism of Oliver Wendell Holmes' *Autocrat at the Breakfast-Table*.†

There can be no doubt that the editor delighted to dip his pen into a biting acid. The New York Academy of Medicine is severely criticized; many jokes are cracked at its expense. The most amusing article written about the Academy is called "The Third Anniversary Oration for the New York Academy of Medicine, which was not delivered before that Remarkable Body, but ought to have been, at their Annual Meeting, held in the Chapel of the University, November 14th, 1849, by the Physician who was not elected for that occasion. (Published without the knowledge or consent of the Academy)." A footnote adds, "To 'the Fellows' of the New York Academy of Medicine, who advertise themselves alphabetically as the 'Medical Profession Proper', this very inadequate appreciation of their worth,

** Kelly, H. A. and W. L. Burrage, *Dictionary of American Medical Biography*, New York and London, 1928, pp. 329-30.

† *Scalpel*, New York, 1849-50, II, 373-86.

and imperfect exhibition of their merits, is gratuitously prescribed by the author."* The running title in the magazine states that the address was delivered "By the Medical Heretic." The address was reprinted in pamphlet form, a copy of which is in the Academy. It is wholesome occasionally to hear criticism of ourselves, but we can imagine the feelings of the Academicians of those days as some of the achievements of their society were described: "Many cases of Diarrhoea, Dysentery, Drunkenness and even Fever, would have been entirely omitted from the Cholera reports, but for us," and again: "But having taken our position, we say, with one of our Public Men, on a similar occasion, 'The Academy—right or wrong—The Academy!'" Some of the "hits" are as clever as those of "Peter Porcupine" [William Cobbett] in his magazine *The Rush-Light* (of which the Academy of Medicine has the first six of the complete set of seven numbers published in 1800) in which Benjamin Rush receives hard knocks. Some of the other articles which are about the Academy or refer to it, are: "New York Medical Cliques and Cliniques," "Badger-Hunting in the Academy," "The Academy and their List of Prices; Tapping and Healing, 50 cts.; Boiled Mutton and Turnips, 1s 6d," "Deputation of the Academy," "The North-West Passage to Medical Ethics, discovered by the Academy," "The poodle in Paris," "Shocking Outrage on Professional Humanity," "A Popular Drama. A hint to the Academy of Medicine and Mr. Burton," "Academic Gyra-tions; Medical Dog-Shaving. A Philanthropic Proposition by the Editor," and "The Medical Crows; their Prolific Nature; the Great Hatching Place. . . ."

In the statuette in caricature is seen the *Scalpel* magazine, standing on end, which Dixon grasps with a large clawlike left hand. On the back of this Trudeau inscribed "Mai 1858," and, above the date, a rough sketch of Dixon riding a hobby horse. We are thankful today that both Edward H. Dixon and James de Berty Trudeau rode their hobbies so hard, for these have provided us with much amusement.

* *Scalpel*, New York, 1849-50, II, 373-86.

CLAUDE TARDI

(1607-1670)

EARLY ADVOCATE OF DIRECT TRANSFUSION OF HUMAN BLOOD

GERTRUDE L. ANNAN

In turning the pages of history, we encounter among dry facts and dull details the charm of human qualities, the virtues, the foibles, the curious contradictions, which blend their varied colors in portraits of half forgotten men. Through these personal records many, prominent in the development of medicine, live for us today instead of seeming vague figures in a misty past. Claude Tardi, a French physician of the seventeenth century, emerges for a brief moment from obscurity, claiming achievements posterity has never accredited him; showering abuse on his contemporaries; offering devotion to many who came before; and giving a clear picture of himself as a braggart and controversialist, vainly struggling to win recognition.

Little is known of the early life of Tardi. According to a paragraph in *Annuaire de la Haute-Marne*, Chaumont, 1811, p. 161, he was born in Langres, the eighth of March, 1607, the son of George Tardi and Anne Monginot. Knowledge of his life from his birth until the time he was awarded his medical degree by the *Faculté* in 1645, is meager indeed, but he has supplied some information in the long "Preface pour la Deffense de l'Autheur" which introduces his *Les Operations Chirurgiques esclairées des Experiences du Mouvement circulaire du Sang et des Esprits*, Paris, 1665. From this we learn that he spent several years of his youth studying in the "best Colleges of Paris," reading chiefly the Greek philosophers. Here he acquired a taste for the classics which is evident in most of his writings, and he undoubtedly planned to extend these pleasant years, but financial reverses at home put an end to them and forced him to turn his attention to earning a livelihood. Ignoring his family's desire for him to take religious orders, he clung to

his old interests and began his career as a lecturer in philosophy. He must have been a thrifty youth, for it was not long before he was able to return to his studies and thus to realize an old dream, to practice medicine. In his own words, he "easily acquired first place among his companion scholars, took care to instruct them, dissected with his own hand the bodies of men and women, gave a demonstration without the assistance of a doctor before the school and in the amphitheatre, worked on surgical operations, and displayed the technique of bandaging." He taught chemistry, the aphorisms in Greek, the doctrine of simples, their choice and mixture. It is difficult to see how he had time to attend lectures when he devoted himself so much to his less brilliant fellow students. He supplemented his class work by living for two years with an apothecary. Here he acquired more knowledge of drugs. He visited the hospitals daily, making rounds with the doctors and absorbing what he could from their diagnosis and treatment. Finally he was ready to engage upon the practice of his profession.

His "Deffense" goes on, "I never refused assistance to the poor; I did charity work for several hospitals, parishes and communities. During the plague the more timid doctors withdrew from the perils, but I exposed myself throughout the epidemic. I performed cures which brought me honor and the approbation of the world." About this time the trouble started which was to haunt his career. It was the custom for every young doctor to become a candidate for the "Baccalauréat." The examiners appointed by the *Faculté* recommended the most promising candidates to the members of the *Faculté*, who made the final decision by their votes. According to Tardi's story he was named by the examiners as the first of three, chosen out of eighteen candidates, but when his name was voted upon, his jealous enemies kept him from being elected. This was a bitter blow. Tardi spoke often of his enemies, but did not name any of them, and whether they were real or imaginary is an open question. At any rate it was a rather unusual procedure for the *Faculté* to ignore a highly recommended candidate. The *ancients*, whom Tardi felt were his friends,

advised him to present to the *Parlement* a request for an explanation of the action taken by the *Faculté* and a demand for a further examination. It might not have been difficult for him to raise some commotion over the matter, as he was well acquainted with Nicolas Lejay, the first President of the *Parlement*. But Tardi for once displayed a shade of modesty and deference and decided to wait until he was voluntarily admitted.

The years spent in the study of Greek had made him familiar with the classical writers in medicine. His constant allusions to medical men of previous days showed a good background of the history of his subject. In his *Defense* he touched on Egyptian medicine, Greek medicine and the parts played by Aesculapius, Hippocrates and Galen, and burst forth in a eulogy upon himself. "Coulon [Realdus Columbus] recognized the necessity of the circulation of the blood and spirits in the heart & lungs. Harvey discovered it in the large veins, and I, I have written of it & demonstrated it publicly in all parts: I have given an easy means of making the experiments; I have discovered all the causes of confinement, of crises, of the cure of unknown maladies. I have included the whole doctrine of Hippocrates in my theses, & yet my enemies have little to win for themselves against my great learning. They have rendered to me every imaginable injustice instead of honor. They have overlooked my words for phantoms, not being able to understand them nor the doctrine of Hippocrates which I explain: they wish to attribute to me their own weakness and to pretend that I do not know what they cannot comprehend."

It was not until 1645 at the age of thirty-eight that Tardi finally became a licensed physician. Not to be wondered at are his outbursts and vituperation addressed to the *Faculté*. "The *Faculté* has always treated me very rudely, depriving me of my employment and taking away from me opportunities to work. Men of honor allow others to practice their malignity. They do not dare to offer me any office, yet they are astonished that a man of my type lives

without wealth." He raged about the malice and envy of his opponents and in glowing terms spoke of the excellence of his own work. He told of sacrificing his whole life to study. The treatment of a difficult disease was more enjoyable for him than a ball, a play, or a festival. He gave up all other pleasures for the public good. "Those who follow my orders are never sick, & I myself, even though very delicate, have never needed any remedy for the last twenty-two years, never having missed one day in making my visits."

He had been admitted to the *Faculté* twenty-two years before this *Defense* appeared, but his bitterness had not been ameliorated with time. His anger toward the *Faculté* never lessened, and although on the title-pages of his works he described himself as "D. R. en la Faculté de Medecine A Paris," he showed that honorable organization little respect. The *Faculté* seems to have been surprisingly gentle with its member who roundly abused it and did not always accede to its orders. Tardi's devotion to the classics was responsible for another altercation with the *Faculté*. Tardi had published several commentaries on Hippocrates and Galen and in 1657 his French translation of Galen on the formation of the foetus appeared. Today a good translation from the ancient writers in Greek and Latin is greeted with enthusiasm by most of us who find it slow going when we have to read the originals. The scholarly gentlemen of the *Faculté* had quite a different point of view. They were horrified that one of the "princes" of medicine had been put into a "common tongue," and demanded that the indiscretion should not be repeated. Tardi still nursing bitter thoughts of these gentlemen paid no attention to their words. Having had previous experience with their wayward fellow member, the *Faculté* decided to pay him 300 livres annually with the stipulation that he refrain from publishing anything without their consent or approval. Tardi was as usual in financial difficulties, and he accepted the bribe, but this did not hinder him from publishing his translation of Hippocrates in 1667. More of an interpretation than an exact translation, it bears the title, *Les Oevvres*

du grand Hippocrate, divisees en deux tomes, ov toutes les Causes de la Vie, de la Naissance & de la Conservation de la Santé; les Signes & les Symptomes de toutes les Maladies sont nettement expliquées, avec leur Guerison, par les Lumieres du Mouvement circulaire, et autres nouvelles Experiences. To Tardi, Hippocrates was not merely one of the "princes" of medicine, but rather the divine master. Recent work, he felt, only served to clarify the words of Hippocrates. Even Harvey's demonstration of the circulation of the blood was no new discovery, but one described by Hippocrates centuries before.

Little value is now placed upon Tardi's translations which met with so much disapproval. His wonderful cures and "expériences" of which he boasted have long since sunk into complete oblivion. One definite claim only has survived, and this from no other pen than his own in his *Traité des l'Ecoulement du Sang d'un Homme dans les Venes d'un Autre, & ses Utilitez*, Paris, 1667. Here he stated that he was one of the "inventeurs" of blood transfusion and described the process minutely. The importance of his work is hard to determine, for we depend solely upon his word. His name is conspicuously absent in records of the history of blood transfusion, although he was apparently the first to publish an account of the process performed from one man to another. The experiments of Wren and Lower in 1666 are well known, but they were entirely confined to animals. In 1667 Denys was the first to accomplish transfusion on a human being, the blood having been supplied by a lamb. Tardi in a letter dated 30 Octobre of that same year (to Le Breton) spoke of his tract on blood transfusion as having been printed about seven months before, so his experiments must have been made at the same time as those of Denys. A translation of part of his paper follows.

The blood is the matter and aliment of the whole body, its principal use is to moisten, because man is the hottest of the animals, and has need of continual refreshing. That is why transfusion is useless to many people; it would be pernicious in all the hot maladies, in inflammations, to young people, to bilious men, and to those in general who have too much or enough blood. The

aliments taken by the mouth refresh much better than the blood whoever is of a hot nature; they resist the action of the heat and refresh the entrails, by their extreme humidity. They conserve all the parts which serve the chyle and the preparation of the blood; for they [the parts] are destroyed, not performing their functions. Transfusion can be practiced through the feet of man, because one can avoid the nerves there, the arteries and chance of convulsions; and one can plunge both of them together into hot water.

The hand which is suitable to take and give all sorts of things, is also very easy to receive and give blood; it is better for transfusion than the foot. The two hands of the same man communicate with one another and intertwine through their own nature. The hands of two different persons assist each other very easily also, they are very suitable for the transfusion of blood from one to the other. The right hand unites itself and applies itself very usefully to the right hand [of the other], and the left to the left.

The transfusion from the arteries into the veins is the most natural and easy way, but it is more dangerous, as it is subject to the dangers of aneurysms, to convulsions and to sudden death. One can perform it on the arteries of the fingers and wrist of man, in the same manner as one can do it in the arteries of the leg of dogs.

The blood and the spirits can pass more surely from one vein into another by an operation very different and much more laborious. This kind of transfusion ought to be done after sleep and in the morning, the spirits being calm, and the strength better; it should be done promptly and by two able surgeons, since it is done at the same time on two different persons, in this manner.

Cut lengthwise on the same side, right or left, the skin of the arm of the two people on whom you are going to operate; cut it over the vena basilica or median without wounding it. Expose and tie with a noose each of the veins in two places, separate the nooses one from the other about a good inch. Open the veins between the ligatures, then introduce a bend-pipe in the end of the vein nearer the heart, which is to receive the blood, and tie it with a noose. The other end of this same vein ought to remain tied as before, if bleeding is not expedient. If it [bleeding] is necessary one can untie it, in due time and place, and draw the patient's blood, as much as he has received, more or less. Let the blood flow over the arm, without making him undergo the pain of a new ligature or of a pipe.

The cut end of the vein of the healthy man which is nearer the heart does not need so tight a ligature, as it happens always to exhaust itself by its own attraction; but it is very necessary on the cut end of the vein nearer the hand. One ought to introduce there a bend-pipe similar to that used on the patient and tie it strongly above, for it is through the other end of it that all the blood flows and passes. One ought also to tie the arm above the elbow, as one does in bleeding. There are then only two ligatures and two pipes which are absolutely necessary; one of the pipes fits into the hollow of

the vein which is nearer the hand of the healthy man; the other fits into that which is nearer the heart of the patient.

Make both men sit down opposite each other, so that their left or right legs touch. Lift their hands and apply them reciprocally on their shoulders. Introduce then the pipe of the healthy man into that of the sick, without pulling it, because the vein shrinks and is weakened by lengthening it. Join exactly the two pipes, as well as you can; warm them, and put over them a small cloth, dampened with warm mucilage or dipped in spirits of wine.

Tie gently the two arms of the two men together, in two places, four fingers above and four fingers below the openings. Loosen then the ligature of the end of the vein which is nearer the hand of the healthy man; apply the cloth without ceasing, as much on the outside as on the inside up to the pipes.

Bathe also the arm of the patient, up to the arm-pit and the shoulder. Bathe them continually with sponges and with cloths dampened and moistened with hot water, or with an emollient decoction; and you will see, doubtless, that the blood will flow from one to the other in abundance. The blood which pours out and leaves the veins does not flow as well as that which carries itself to the heart of the patient, lacking one of the two necessary causes for all natural movements, which is attraction, movement or heat of the parts which receive it. Make the blood of the healthy man flow as much as the force will permit: let him eat and rest, he will be able to furnish blood a second time on the same day, by the same opening, tying and loosening the ligature of the vein. If the superfluous blood of one man does not suffice, one can receive that of two, of three and even of more, choosing always the most suitable.

Lacking a capable surgeon, I can myself perform the transfusion alone, having practiced all my life, not only at operations on the dead, but also on living bodies.

The flowing of blood from the body of a man into the veins of another is admirable and very useful to the conservation of health and to the cure of several maladies. Old men and all those whose vessels are full of bad humors and of tainted blood, can preserve themselves by receiving, at several and different times, the blood of a more healthy body & very good constitution, at the same time that their cacochylia evacuate. By this means the vicious humors are exhausted, little by little, and the good remain; the constitution of the entrails can reestablish itself, or preserve itself better, in the natural constitution.

Strange and contrary blood is salutary and very useful to the body of a man, when it is suitable to correct its inclemency. The coarse blood of some apoplectics and weakened men can be blended and revived by the transfusion of fine blood, drawn from the heart and the arteries of a young impetuous man. Dropsy of the stomach, pituitous humors, and that which comes from exhaustion, can be cured in the same way. Blood transfusion is absolutely necessary in all the maladies where the stomach, the throat, the guts and

the liver fail in digestion or the distribution of food. It gives time and strength for the cure of lienteric, coelitic and dysenteric symptoms.

The opposition raised by the less progressive doctors and the antagonism aroused by the fatal outcome of some of Denys's cases, was already sweeping through France. To Tardi's credit may it be said in spite of his longing for a prominent place in medicine, he did not espouse the popular and stronger cause. Nor did he allow his reverence and devotion to Hippocrates to blind him to the benefits of this new experiment. He is a wise man who can recognize the good of both old and new. Tardi did not abandon the one for the other. He continued to champion blood transfusion, and addressed a letter on the subject to Le Breton, fellow member of the *Faculté* and physician to one of the Royal family. His cause, however, was already lost. Blood transfusion was soon forbidden, and for over a century its practice was neglected.

Tardi's letter to Le Breton, Paris, 1667, seems to be his last appearance in print. He died on the twelfth of December, 1670. A life of disappointment, failure and poverty had turned the young student into a bitter man. His animosity toward his fellow physicians and his extravagant praises of his own work had not helped him to win the honors he coveted in his profession. A lonely figure he must have been, vainly boasting in the imprint of his letter to Le Breton that copies might be obtained, "At the home of the author, at the Image of Saint Anne, Rue des Arsis, where he will explain the difficulties of those who visit him, give them advice and teach the true medicine."



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- von Baeyer, W. Zur Genealogie psychopathischer Schwindler und Lügner.
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tions.
N. Y., Commonwealth Fund, 1935, 158 p.

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- Hommage à la mémoire du Professeur Jean Cantacuzène.
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N. Y., Macmillan, 1935, 203 p.
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St. Louis, Mosby, 1935, 694 p.
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PROCEEDINGS OF ACADEMY MEETINGS NOVEMBER

STATED MEETINGS

November 14

- I. EXECUTIVE SESSION—a. Reading of the Minutes; b. Election of Members; c. Election of Fellows; d. Report of Nominating Committee.
- II. PAPER OF THE EVENING—Medicine in the Days of the Great Monarch, Howard W. Haggard, Yale University.

THE HARVEY SOCIETY (IN AFFILIATION WITH THE NEW YORK ACADEMY OF MEDICINE)

November 21

THE SECOND HARVEY LECTURE, "The Significance of Chimpanzee-Culture for Biological Research," Robert M. Yerkes, Professor of Psychobiology, Yale University.

SECTION MEETINGS

SECTION OF DERMATOLOGY AND SYPHILOLOGY—November 6

- I. READING OF THE MINUTES.
- II. a. PRESENTATION OF CASES; b. MISCELLANEOUS CASES.
- III. DISCUSSION OF SELECTED CASES.
- IV. EXECUTIVE SESSION—Examination of cases is limited to members and their invited guests.

COMBINED MEETING OF THE SECTION OF NEUROLOGY AND PSYCHIATRY and THE NEW YORK NEUROLOGICAL SOCIETY—November 12

- I. Nervous system trichiniasis, Milton Abeles (by invitation); Discussion, Joseph H. Globus, Charles Davison.

- II. Posterior fossa tumors without papilloedema, Ira Cohen; Discussion, Israel Strauss, Moses Keschner.
- III. The value of quantitative olfactory tests for the localization of supratentorial tumors of the brain (preliminary report), Charles A. Elsberg; Discussion, Frederick Tilney, Foster Kennedy, Israel Strauss.

COMBINED MEETING OF THE SECTION OF HISTORICAL AND CULTURAL MEDICINE and the SECTION OF OBSTETRICS AND GYNECOLOGY—November 13

- I. READING OF THE MINUTES.
- II. PAPERS OF THE EVENING—a. Sir James Simpson and obstetrical anesthesia, Benjamin P. Watson; b. Marion Sims and the origin of modern gynecology. With lantern slide demonstration and exhibit of mementos, George Gray Ward.

III. GENERAL DISCUSSION.

SECTION OF PEDIATRICS—November 13

- I. PAPERS OF THE EVENING—General Subject: Developmental Diagnosis and Clinical Pediatrics—a. The developmental diagnosis of infant behavior, Arnold Gesell, Director of Clinic of Child Development, Yale University School of Medicine (by invitation); b. A case of birth injury: 1. Behavior aspects, Arnold Gesell (by invitation); 2. Neuropathology, H. M. Zimmerman, Associate Professor of Pathology, Yale University School of Medicine (by invitation); c. A comparative study of six infant cretins under treatment: 1. Diagnostic aspects, Catherine Strunk Amatruda, Research Pediatrician, Yale Clinic of Child Development (by invitation); 2. The influence of thyroid on mental growth, Arnold Gesell (by invitation).
- II. DISCUSSION—Margaret E. Fries, Foster Kennedy, Marion E. Kenworthy, Louis C. Schroeder, Herbert B. Wilcox.

JOINT MEETING OF SECTION OF ORTHOPEDIC SURGERY and the PHILADELPHIA ORTHOPEDIC CLUB—November 15

- I. READING OF THE MINUTES.
- II. PAPERS OF THE AFTERNOON—a. Scoliosis; 1. Treatment and end results in scoliosis, Alan DeForest Smith; 2. Question of operation for severe scoliosis, Elmer P. Weigel; 3. Exercise treatment of scoliosis, Christian G. Hansson; b. Equalization of the length of legs; 1. By shortening, Benjamin Farrell; 2. Cases of leg lengthening—lantern slides and cases, Armitage Whitman; 3. Cases representing tibial lengthening, David M. Bosworth; 4. Discussion of post-operative results of bone lengthening by author's method, George Anopol; 5. Demonstration of leg lengthening apparatuses, George Anopol, Harry Finkelstein, David R. Telson; c. Recent developments: 1. Nailing and epiphysiodesis for slipped femoral epiphyses, Philip D. Wilson; 2. The preformation of tendon sheaths for tendon transplants to the fingers, Leo Mayer, Nicholas S. Ransohoff; 3. Acetabular reconstruction for congenital dislocation of the hip, Paul Colonna; 4. Transplantation of tibial tubercles for knee flexion deformity in spastic paralysis, Mather Cleveland; 5. Injection of the fascial spaces for diagnostic and therapeutic purposes, Charles Murray Gratz.

SECTION OF OPHTHALMOLOGY—November 18

INSTRUCTIONAL HOUR, 7:00-8:00—Isadore Goldstein—Plastic surgery of the eyelids.

SLIT LAMP—Demonstration of Cases, 7:30-8:30—Milton L. Berliner, Girolamo Bonoccalto, Gordon M. Bruce, Wendell L. Hughes.

DEMONSTRATION OF NEW EXOPHTHALMOMETER, 7:30-8:30—Mark J. Schoenberg.

PROGRAM, 8:30—1. Reading of the minutes; 2. Presentation of cases; a. Gold particles in the cornea (5 minutes), Clyde E. McDannald; Discussion, Wendell L. Hughes; b. Aniridia—report of four cases—mother and three sons (10 minutes), James W. Smith; Discussion, Mark J. Schoenberg; c. Conjunctivitis due to fuso-spirochetal organisms (10 minutes), D. L. Khorazo (by invitation); Discussion, James G. Dwyer; 3. Papers of the evening; a. Exophthalmos in general disease (30 minutes), Albert D. Rueemann, Cleveland (by invitation); Discussion, Arnold Knapp; b. Retinal and central

nervous hemangioblastomatosis (von Hippel—Lindau Syndrome). A clinico-pathological study (20 minutes), Samuel Brock, Charles Davison, Cornelius G. Dyke (by invitation); Discussion, Ernest Krug.

SECTION OF MEDICINE—November 19

I. READING OF THE MINUTES.

- II. SYMPOSIUM ON NEPHRITIS; 1. The biology of excretion, Homer W. Smith (30 minutes); 2. Chemical aspects of nephritis, Irvine H. Page (25 minutes); 3. Pathological studies in nephritis, Milton Helpern (25 minutes) (by invitation); 4. Some clinical features of nephritis, Arthur M. Fishberg (25 minutes); Discussion, Robert Chambers (5 minutes), Donald D. Van Slyke (5 minutes), Robert O. Loebel (5 minutes), Herman Mosenthal, Albert Epstein.

COMBINED MEETING OF SECTION OF GENITO-URINARY SURGERY AND SECTION OF SURGERY—November 20

I. READING OF THE MINUTES.

- II. PAPERS OF THE EVENING—a. The clinical picture of ureteral colic: its differentiation from the acute intraabdominal surgical syndromes, Edward M. Livingston, Hyman Lieber (by invitation); b. Urogenital symptoms referable to intraabdominal diseases, Charles Gordon Heyd; c. Abdominal symptoms referable to diseases of the urogenital tract, Edwin Beer; Discussion by Meredith F. Campbell, John Douglas, Henry G. Bugbee, Henry W. Cave.

III. GENERAL DISCUSSION.

IV. EXECUTIVE SESSION.

SECTION OF OTOLARYNGOLOGY—November 20

I. READING OF THE MINUTES.

- II. PRESENTATION OF CASES—Clinical demonstrations, at the Manhattan Eye, Ear, Nose and Throat Hospital, 210 East 64 Street, from 2 to 6 P.M., by various members of the Staff.

- III. PAPERS OF THE EVENING—a. Present status of otitic meningitis, James G. Dwyer; b. Perilabyrinthitis, Marvin F. Jones; c. Preliminary report on an operation for the relief of double abductor paralysis, John M. Loré; d. Perforation of the cervical esophagus and its management, David H. Jones; e. Ionization for allergic rhinitis, Henry Alfred Barrett (by invitation); f. Plastic repair for hypertrophied nose. Moving picture demonstration, Clarence R. Straatsma (by invitation).

IV. GENERAL DISCUSSION.

- V. EXECUTIVE SESSION—Note: Clinical conference, Wednesday afternoon, at Manhattan Eye, Ear, Nose and Throat Hospital.

SECTION OF OBSTETRICS AND GYNECOLOGY—November 26

- I. PAPERS OF THE EVENING—General Subject: Diabetes and Pregnancy; a. The increasing incidence of diabetes and pregnancy, Elliott P. Joslin, Boston (by invitation); b. Diabetes in pregnancy from the standpoint of the obstetrician, Raymond S. Titus, Boston (by invitation); c. The experience of the internist, Priscilla White, Boston (by invitation); d. Prolan and estrin throughout pregnancy in the blood and urine of normal and diabetic women, George V. Smith, Boston (by invitation), Mrs. O. Watkins Smith, Boston (by invitation).

- II. DISCUSSION OPENED BY Herman O. Mosenthal, R. Gordon Douglass (by invitation), Charles H. Peckham, Baltimore (by invitation), Joshua Ronsheim, Brooklyn (by invitation), Alfred C. Beck, Harvey B. Matthews.

AFFILIATED SOCIETIES

NEW YORK ROENTGEN SOCIETY in affiliation with THE NEW YORK ACADEMY OF MEDICINE—November 18

I. PRESENTATION OF INTERESTING CASES.

- II. PAPER OF THE EVENING—Roentgen diagnosis of the heart and great vessels, Geza Nemet (by invitation).
- II. DISCUSSION to be opened by Marcy L. Sussman, C. V. Kilbane, George Plehn, Cary Eggleston.
- V. EXECUTIVE SESSION

NEW YORK PATHOLOGICAL SOCIETY in affiliation with THE NEW YORK ACADEMY OF MEDICINE—November 26

- I. PRESENTATION OF PATHOLOGICAL SPECIMENS
- II. PAPERS OF THE EVENING—a. Observations on lymphogranuloma venereum, Boris A. Kornblith (by invitation); b Primary sarcoma of the breast, Seaton Sailer
- NEW YORK MEETING OF THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE—November 20
- I. Serum phosphatase activity in seventeen cases of osteoporosis circumscripta of the skull, A B Gutman, E B Gutman, H H Kasabach (Introduced by W W. Palmer)
- II. Polarity in lethal action of electric current, V Schechter (by invitation).
- III. Distribution of blood groups and agglutinogen M among Indian "Blackfeet" and "Blood" tribes, P Levine, G A Matson, H F Schrader
- IV. Effect of administration of estrogenic factor on hypophyseal hyperactivity in menopause, R T Frank, U. J Salmon
- V. Susceptibility to lysozyme of staphylococci, R Thompson, D Khorazo (Introduced by C W. Jungeblut).
- VI. A convenient method for preparation of concentrates of follicle stimulating hormone from urine, E Brand, R J Block, M M Harris, L E Hinsie.

MEMBERS ELECTED, NOVEMBER 14, 1935

Albert A. Cinelli	1021 Park Avenue
Irving Claman	40 East 88 Street
Katherine Gray Dodge	215 East 73 Street
Fred Squier Dunn	315 East 68 Street
Cornelius G. Dyke	730 West 168 Street
Ernest Risley Eaton	53 West 83 Street
Herbert Robert Edwards	35-28 87 Street, Jackson Heights
Clarence Clifton Hare	115 East 61 Street
Meyer M. Harris	39 Tompkins Avenue, Hastings
Herbert F. Jackson	310 West 86 Street
Abraham R. Kantrowitz	475 Ocean Avenue, Brooklyn
Lewis Henry Koplik	311 East 72 Street
Charles T. Olcott	1300 York Avenue
Otto Carl Risch	104 East 40 Street
William D. Sherwood	123 East 53 Street
William G. Terwilliger	168 East 74 Street
James Edwin Thompson	107 East 67 Street
David Merril Weeks	30 East 76 Street
Blandina Worcester	178 East 70 Street
David Irving Arbuse	1325 Grand Concourse

Leslie Paxton Barker.....	915 West End Avenue
Edgar M. Bick	320 Central Park West
David Robert Climenko	346 East 51 Street
Robert Page Rogers.....	111 North St., Greenwich, Conn.
Edward Markey Pullen.....	30 East 40 Street
Herman Bernard Schoenberg	121 East 60 Street
George Kay Tweddel.....	239 Broadway, Paterson, N. J.
Roy Upham	45 East 74 Street

FELLOWS ELECTED, NOVEMBER 14, 1935

Fellow in Internal Medicine:

Edward H. Rogers, 108 East 86 Street

Fellow in Orthopaedic Surgery:

Philip D. Wilson, 157 East 61 Street

DEATHS OF FELLOWS OF THE ACADEMY

BISSELL, DOUGAL, B.A., M.D., 55 East 76 Street, New York City; graduated in medicine from the University of Maryland in 1888; elected a Fellow of the Academy October 4, 1906; died November 3, 1935. He was a Fellow of the American Medical Association and of the American Gynecological Association and was one of the founders of the American College of Surgeons. He was a member of the State and County Medical Societies, a former president of the New York Obstetrical Society, and from 1910 until his retirement he was Surgeon to the Woman's Hospital.

CHALMERS, THOMAS CLARK, M.D., 68 Dartmouth Street, Forest Hills, New York, graduated from Bellevue Hospital in 1897; elected a Fellow of the Academy January 15, 1920; died November 16, 1935. Dr. Chalmers was a Fellow of the American College of Physicians; past president of the Society of Medical Jurisprudence, the Medical Society of the County of Queens, the Medical Association of Greater New York; a member of the County and State Medical Societies, and of the American Medical Association. At the time of his death, he was physician to Queensboro Hospital.

KING, JAMES JOSEPH, A.B., M.D., 133 East 58th Street, New York City, graduated in medicine from the University of Tennessee in 1904 and from the University of Louisville in 1907; elected a Fellow of the Academy January 7, 1915; died November 29, 1935. Dr. King was a Fellow of the American Medical Association, a member of the American Academy of Ophthalmology and Otolaryngology; Consultant at the French Hospital and Hospital for Ruptured and Crippled, and a member of the County and State Medical Societies.

NORTHRUP, WILLIAM PERRY, B.A., M.A., M.D., 114 East 75th Street, New York, graduated in medicine from the College of Physicians and Surgeons, New York City in 1878; elected a Fellow of the Academy December 2, 1886; died November 20, 1935. Dr. Northrup was a member of the County and State Medical Societies, a member of the American Medical Association, the Pediatric Society, the Association of American Physicians, and the Pathological Society. For twenty-seven years, 1893-1920, Dr. Northrup was Professor of Pediatrics at the New York University and Bellevue Hospital Medical College, and during the same period was also attending physician at the Presbyterian Hospital. He was professor emeritus of New York University and consultant to the Presbyterian, Willard Parker, Foundling, and N. Y. Nursery and Childs Hospitals. Dr. Northrup had been president of the New York Pathological Society, the American Pediatric Society, the Association of American Physicians and a member of the Clinical Society of New York.

THOMSON, JOHN JOSEPH, M.D., 531 East Lincoln Avenue, Mount Vernon, New York; graduated in medicine from Trinity University, Toronto, Canada in 1902; elected a Fellow of the Academy March 7, 1907; died November 13, 1935. Dr. Thomson was a member of the County and State Medical Societies, the American Otological Society, the American Laryngological, Rhinological and Otological Society, the American Academy of Ophthalmology and Otolaryngology, the New York Otological Society, The Mount Vernon Medical Society, the Westchester Medical Society, and was a Fellow of the American Medical Association and of the American College of Surgeons. Dr. Thomson headed the otolaryngological department of Lawrence Hospital, Bronxville, and for fourteen years was president of the medical board of Mount Vernon Hospital.

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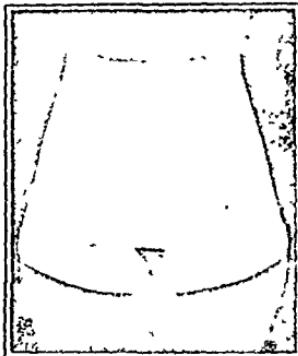
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were frequent among students of colleges and universities, and now that it is all over it is amusing to see the attempts that were made by college and town authorities to shift the responsibility for them.

Also there were villages and isolated houses to which typhoid clung with inexplicable pertinacity, and solitary cases or small groups appearing here and there in healthy communities for which no explanation could be found.

It was to be Mary Mallon's fate to clear away much of the mystery which surrounded the transmission of typhoid fever and to call attention to the fact that it was often persons rather than things who offered the proper explanation when the disease occurred in endemic, sporadic and epidemic form.

It happened that in 1907 I had had a good deal of experience with typhoid fever. This began when as an undergraduate student passing my Christmas holidays at Warrensburg in the Adirondacks, I had the temerity to move two typhoid patients and their families out of a house which had a long history of communicable disease and, with the consent of the owner, burn it to the ground. My experience grew with my years. Eventually I was called on to investigate and put a stop to many epidemics, numbering the City of New York and the State of New York among my clients. I was called an epidemic fighter.

When I went to Oyster Bay, the first thing I did was to get together all the essential facts about the outbreak: the dates of attack, the diagnoses, and like information. The next was to check over the possible sources and channels of infection as suspected and studied by preceding investigators. This check up was done with the utmost care, my assumption being that somebody might have overlooked some important detail.

I was disappointed. They had done their work thoroughly. Try as I would, I could not find anything wrong. The nearest explanation was that an old Indian woman who lived on the beach had brought polluted shellfish to the household, but this theory would not stand the rigorous inquiry which I gave it.

So I turned my attention from the well, the overhead tank, the cesspool, the privy, the manure on the lawn, the food supplies, the bathing and the sanitary condition of the neighboring property to the people in the house. I thought it probable that some event outside of the usual routine in this well-regulated household had occurred a little before the outbreak began. Had a carrier come to the house?

The idea of carriers was not entirely new to me. I had taken care to guard against carriers — urinary carriers — in my epidemic work. As is well known, a considerable percentage of convalescents pass a highly infected urine for many weeks after they are sufficiently recovered to go about; so I had had urotropin put up in convenient form to administer and issued an order that no patient might be discharged from medical attention until his urine was proved to be bacillus-free.

It was hard to identify typhoid in the feces by current bacteriological methods. I had read an address which Koch had delivered in 1902 on typhoid investigations in Trier which were based on a paper by Conradi and Drigalski in the same year, setting forth results they had obtained with a new culture medium in examining the stools of apparently well persons. A *Festschrift* on the sixtieth birthday of Koch, which appeared in 1903, contains several papers on the probable role of healthy carriers in producing typhoid, and publications by others in Germany were to like effect. Most of these I had not seen until Dr. Simon Flexner called my attention to them after I had concluded my work on the Mary Mallon case.

Nothing of the kind had been done in America and the discovery of Typhoid Mary brought to light for the first time in America, or any other English-speaking country, a chronic typhoid carrier with infected feces. This type of carrier is now regarded as by all means the most common.

Having undertaken to see if there had been any carriers in the Oyster Bay house before the outbreak there occurred, I soon came, through the process of exclusion, to the cook. But where was she? She had left soon after the epidemic and that event had occurred over six months ago. I tried to find out everything I could about her, but there was not much to learn. Mrs. Warren said she was a good plain cook, her wages were forty-five dollars a month, and she had been obtained from Mrs. Stricker's. Stricker's was a well-known employment agency on Twenty-eighth Street. The cook had not fraternized with the other servants and they knew little about her. She was not particularly clean. Her name was Mary Mallon. That was about all.

But some of the details were of great significance. The cook had come to work on August 4, the first person fell ill August 27, and the last September 3. It seemed probable that all of the patients, the dates of whose attacks fell within a period of seven days, were infected at the

same time and that this was after the new cook's arrival.

It was not at first clear how the family could have been infected from the cook, granting that she was a carrier, for, where there are so many servants, there is little food that a cook handles which is not subsequently raised to a temperature sufficient to make it harmless. I found, however, that on a certain Sunday there was a dessert which Mary prepared and of which everybody present was extremely fond. This was ice-cream with fresh peaches cut up and frozen in it. I suppose no better way could be found for a cook to cleanse her hands of microbes and infect a family.

I went to the employment agency which had sent the cook and explained the situation. I asked for Mary's references, for I wanted to know where else she had worked. I obtained all the help that could be given there, but it was not very much.

Mary appeared to be a person who moved about a good deal; she did not remain long in any situation. She did not get all her situations through one agency, or any agency for that matter. Sometimes they came through advertisements.

I found some of the places where Mary Mallon had worked and asked if anything unusual had happened there. I would like to describe at length what I learned, but it would take too long. I uncovered a series of seven household epidemics. They were alike in the unexpectedness with which the cases occurred, the complete ignorance as to the source, the apprehension as to who would be next, the suffering of the patients, the disruption of the household arrangements, the general bewilderment. The cook had, of course, never been suspected as the cause of any of these epidemics.

My earliest record places Mary Mallon at Mamaroneck, where a New York family had a house for the summer. A young man made a visit there and came down with typhoid ten days after his arrival. The date was September 4, 1900. At the time it was thought that he had contracted his disease during a visit to East Hampton, because that place was at no great distance from the Montauk army camp where typhoid was prevalent. No definite route of infection was indicated.

In 1901-'02, Mary lived about eleven months with a family in New York City. A laundress was taken to Roosevelt Hospital with typhoid, December 9, 1901. The case was seen by Dr. R. J. Carlisle, but not investigated.

In 1902 Mary was taken to Dark Harbor, Maine, to a new house that had been rented for the summer by Coleman Drayton, a lawyer of New York City. A case of typhoid fever occurred June 17, two weeks after the cook's arrival. Seven days later a second case occurred. Two days after that there was a third. Soon seven out of the household of nine were sick, the only two escaping being Mr. Drayton, who had had typhoid some years before and was presumably immune, and the cook. A trained nurse followed and a woman who came to work by the day was attacked. The outbreak was investigated at the time by Dr. E. A. Daniels of Boston and Dr. Louis Starr of Philadelphia. The first case was that of a footman; some believed that he had become infected outside and brought the sickness to the house. Dr. Daniels thought the first three cases were simultaneously infected somewhere; but on checking over his report I could not agree with him. I found that the three had not eaten the same food or drunk the same water.

As may be imagined, the household was pretty well upset. Proper help could not be had. Mr. Drayton and Mary Mallon worked side by side taking care of the sick and attending to all the manifold tasks which illness brings upon a family. Mr. Drayton told me that when it was over he had been so grateful to Mary for all the help she had given him that he rewarded her with fifty dollars in addition to her full wages.

In 1904 Mary figured in an outbreak in the household of Mr. Henry Gilsey at Sands Point, Long Island. There were, all told, eleven persons on the place: four in the family and seven servants. The cook arrived on June 1 and on June 8 the laundress, who had been on the place ten days, fell ill of typhoid. Then followed the gardener, the butler's wife, and finally the butler's wife's sister. There were four, all told, who fell ill within three weeks in this outbreak. The cases were all among the servants, and since they lived in a house apart from the family, it was thought that there must be something wrong about their house. Several persons investigated this outbreak, including Dr. R. L. Wilson, superintendent of hospitals for communicable diseases of the New York City Department of Health. His opinion was that the laundress must have become infected before she entered this employment, but, although he tried, he could not find how this could have happened.

After leaving Oyster Bay, Mary Mallon was employed as a cook at Tuxedo. She remained from September 21 to October 27, 1906. Fourteen days after her arrival a laundress was removed with typhoid to

St. Joseph's Hospital at Patterson. She was seen by Dr. E. C. Rushmore.

Here was a curious group of epidemics. In nearly every instance, a well-to-do and socially prominent family, soon after moving from the city to the country for the summer, experienced an outbreak of typhoid fever. In no instance had its cause been satisfactorily explained. The cook always left soon afterward. She had never been suspected.

When at length I caught up with her, which was some four months after I started out on the Oyster Bay epidemic, Mary was working as cook in an old-fashioned, high-stoop house on Park Avenue on the west side, two doors above the church at Sixtieth Street. The laundress had recently been taken to the Presbyterian Hospital with typhoid fever and the only child of the family, a lovely daughter, was dying of it.

I had my first talk with Mary in the kitchen of this house. I suppose it was an unusual kind of interview, particularly when the place is taken into consideration. I was as diplomatic as possible, but I had to say I suspected her of making people sick and that I wanted specimens of her urine, feces and blood.

It did not take Mary long to react to this suggestion. She seized a carving fork and advanced in my direction. I passed rapidly down the long narrow hall, through the tall iron gate, out through the area and so to the sidewalk. I felt rather lucky to escape.

I confessed to myself that I had made a bad start. Apparently Mary did not understand that I wanted to help her. It mattered not that I told her if she would answer my questions and give me the specimens, I would see that she got good medical attention, in case that was called for, and without any cost to her.

As a matter of fact, I did not need the specimens in order to prove that Mary was a focus of typhoid germs. My epidemiological evidence had proved that. Laboriously I had worked out every one of the seven outbreaks and I was positive that Mary had produced them all. Just exactly how she did it I didn't know. I wanted to find out. No doubt her hands played a part in it. They became soiled when she visited the toilet, but whether from her urine or feces I had no way of knowing.

I felt a good deal of responsibility about the case. Under suitable conditions Mary might precipitate a great epidemic.

I found that Mary was in the habit of going, when her work for the day was finished, to a rooming house on Third Avenue below Thirty-third Street, where she was spending the evenings with a disreputable

looking man who had a room on the top floor and to whom she was taking food. His headquarters during the day was in a saloon on the corner. I got to be well acquainted with him. He took me to see the room. I should not care to see another like it. It was a place of dirt and disorder. It was not improved by the presence of a large dog of which Mary was said to be very fond.

I made an arrangement with Mary's friend to meet her in this room; and taking an old assistant, Dr. B. Raymond Hoobler, later head of the Children's Hospital at Detroit, I waited one evening for Mary at the top of the stairs.

Mary was angry at the unexpected sight of me, and although I recited some well considered speeches committed to memory in advance to make sure she understood what I meant, and that I meant her no harm, I could do nothing with her.

She denied she knew anything about typhoid. She had never had it nor produced it. There had been no more typhoid where she was than anywhere else. There was typhoid fever everywhere. Nobody had ever accused her of causing any cases or had any occasion to do so. Such a thing had never been heard of. She was in perfect health and there was no sign or symptom of any disease about her. And she would not allow anybody to accuse her. Again I saw I was making no headway, so Dr. Hoobler and I left, followed by a volley of imprecations from the head of the stairs.

Learning that Mary was going to leave her Park Avenue situation and knowing that if she did so it would be hard to find her again, I brought her case to the attention of Commissioner Thomas Darlington and Dr. Hermann M. Biggs, Medical Officer of the New York City Health Department, and recommended that Mary Mallon be taken into custody. I wanted to have her excretions examined by Dr. William H. Park at the Department's Research Laboratory. I called Mary a living culture tube and chronic typhoid germ producer. I said she was a proved menace to the community. It was impossible to deal with her in a reasonable and peaceful way, and if the Department meant to examine her, it must be prepared to use force and plenty of it.

The Department acted favorably on my recommendation. It would get the specimens peacefully, if possible, but if this was not possible it would get them anyway.

An inspector in the person of Dr. S. Josephine Baker was sent to see

Mary about it. But the success of this gentle yet redoubtable warrior was at first no greater than mine had been. Mary slammed the door in her face.

Next morning a Department of Health ambulance drew up quietly in Sixtieth Street beside the church, with three policemen under Dr. Baker's orders. Two of the policemen were carefully placed so as to prevent Mary from escaping, and one was taken by Dr. Baker with her to the front door. They rang the basement bell and Mary opened the door before she saw who was there. Then she attempted to shut it but the policeman interposed his foot. Mary ran back to the kitchen and disappeared. The doctor and policeman followed quickly, but could not find her. Other servants were there, but they declared they had not seen her. A search was made of the cellar, coal bins and closets, but without result.

On looking out of a rear window Dr. Baker noticed a chair that had been drawn up beside the high fence which separated the property from that adjoining. The ground was covered with snow, and footprints in it led from the house to the chair. Dr. Baker went into the next house and made a thorough search of it but Mary was not to be found. By this time some three hours had been spent in hunting for her.

Dr. Baker then went out into the street and found another policeman and the search was renewed. The hunt was about to be given up when a bit of gingham was seen caught in the door of an outside closet in the rear of the second house. Ashcans were piled against the door. When these were removed, there was Mary. To use Dr. Baker's words:

"She fought and struggled and cursed. I tried to explain to her that I only wanted the specimens and that then she could go back home. She again refused and I told the policemen to pick her up and put her in the ambulance. This we did and the ride down to the hospital was quite a wild one."

A few days later I received a telephone call from Dr. Park, which told me that Mary's bowel movements contained a pure culture of the *Bacillus typhosus*. The examinations were made three times a week from the date of her capture, March 20, to November 16, 1907, and only in a few instances were the typhoid organisms not found.

Some weeks after Mary's arrival at the Willard Parker Hospital, where she had been taken on her arrest, I called on her there. She had been placed in one of the outside isolation wards. In view of her actions

when arrested, she was regarded as a dangerous and unreliable person who might try to escape if given a chance. So she was locked up. It was not an attractive or particularly comfortable room and there was no reason why a strong, active woman of forty who felt herself to be in perfect health, should be contented with it. And Mary Mallon was not.

The room, with its white walls and ceiling and floor, the white bed and the white bathrobe which Mary was wearing, gave the curiously healthy and fearfully angry-looking person a startling appearance.

"Mary," I said, "I've come to talk with you and see if between us we cannot get you out of here. When I have asked you to help me before, you have refused and when others have asked you, you have refused them also. You would not be where you are now if you had not been so obstinate. So throw off your wrong-headed idea and be reasonable. Nobody wants to harm you. You say you have never caused a case of typhoid, but I know you have done so. Nobody thinks you have done it purposely. But you have done it just the same. Many people have been made sick and have suffered a great deal; some have died. You refused to give specimens which would help to clear up the trouble. So you were arrested and brought here and the specimens taken in spite of your resistance. They proved what I charged. Now you must surely see how mistaken you were. Don't you acknowledge it?"

Mary looked at me steadily, but neither spoke nor moved. Her eyes gleamed angrily.

"Well," I continued, "I will tell you how you do it. When you go to the toilet, the germs which grow within your body get upon your fingers, and when you handle food in cooking they get on the food. People who eat this food swallow the germs and get sick. If you would wash your hands after leaving the toilet and before cooking, there might be no trouble. You don't keep your hands clean enough."

Mary's expression did not change nor did she utter a word. I was bound to tell her all that I had come to say, so I continued.

"The germs are probably growing in your gallbladder. The best way to get rid of them is to get rid of the gallbladder. You don't need a gallbladder any more than you need an appendix. There are many people living without them."

"Mary," I continued, "I don't know how long the Department of Health intends to keep you here. I believe that depends partly on you.

I can help you. If you will answer my questions, I will do everything I possibly can to get you out. I will do more than you think. I will write a book about your case. I will not mention your real name; I will carefully hide your identity. I will guarantee that you will get all the profits. It will be easy for you to answer my questions. You know what I want to find out. Above all, I want to know if and when you have had typhoid fever, and how many outbreaks and cases you have seen."

As I finished with my back there against the door, Mary rose. She pulled her bathrobe about her and, not taking her eyes off of mine, slowly opened the door of her toilet and vanished within. The door slammed.

There was no need of my waiting. It was apparent that Mary did not intend to speak to me. So I left the place.

It was not long after my third meeting with Mary that she was sent to Riverside Hospital on North Brother Island. There she was given a little bungalow which had been built for the superintendent of nurses. It consisted of a living room, kitchen and bathroom. It was supplied with gas, modern plumbing and electricity. It was pleasantly situated on the river bank, next to the church.

Mary's food was brought to her; she cooked and ate it alone.

About two years after her arrest Mary sued the City for her release under habeas corpus proceedings, a clever lawyer named George Francis O'Neill bringing suit in the Supreme Court. A strong argument was made on Mary's behalf. It was claimed that she had been imprisoned without due process of law. She had, in fact, not been accused of any crime, nor been given a hearing, nor been represented by counsel.

Mary took the stand and testified that she had never had typhoid fever or caused it in others. She was described by the newspaper reports as robust, bright eyed and energetic.

Dr. Park testified that in spite of appearances and her testimony, Mary was a menace to the community; he had found typhoid bacilli in her excrement and Dr. Soper had traced many typhoid epidemics to her. The judge eventually dismissed the case, saying the Court was unwilling to take the responsibility of releasing her.

When Mary had been incarcerated two years and eleven months, the Health Department released her on her pledge to give up her vocation of cook, not handle the food of others, observe various other precautions and report to the Department every three months. It was

believed that she had had an opportunity by this time to learn all about her condition and how to avoid infecting people.

Various attempts had been made to cure her, but nothing had proved effective. The only thing that remained was to remove the gallbladder, where the germ focus was believed to be situated; but, as Mary would not give her consent to this, it was thought nothing more could be done about the matter.

On her release Mary promptly disappeared. She violated every detail of the pledge she had given to the Department of Health. She changed her name and went to cooking again. Under the name of Marie Breshof, and sometimes Mrs. Brown, she now cooked in hotels, restaurants and sanatoria. At one time she ran a cheap rooming house, but kept it so badly that it failed to pay. She tried ironing, but found cooking paid better.

For five years Mary traveled about New York and its vicinity without restraint and without her identity being discovered by the authorities. I was not asked to find her again, but I think I could have done so. My official connection with the case ended when I cleared up the Oyster Bay outbreak in 1907 and turned Typhoid Mary over to the Health Department. Mary's history during these five years has never been traced in detail, but I know some of the places where she worked and some of the things that happened to her.

The world was not very kind to Mary. She could not resume her cooking in rich private families, for practically all of them got their cooks through two agencies — Mrs. Stricker's and Mrs. Seeley's — and both knew Mary and were afraid to place her.

She never had what might be called a permanent situation. She did not get on well with other servants and wanted to be moving about, anyway.

One day her best friend, a man whose name she often went by, sent for her. He was ill with a bad heart. Mary got him into a hospital, where he died.

She injured her hand; it became infected, and she could not cook for several months. This was too bad, for she had no home and she had little money.

She worked in a Broadway restaurant, a hotel at Southampton, an inn at Huntington, a fashionable hotel in New Jersey, and a sanatorium in New Jersey. There were cases of typhoid which she produced, but

there is no record of all of them. The list includes two children. There was a man for whom Mary mixed a home-made remedy for indigestion and who soon had to be taken off to the hospital with typhoid fever. It is probable that she produced a good many cases in her five-year period of liberty.

One day Dr. Edward B. Cragin, head obstetrician and gynecologist at the Sloane Hospital for Women, telephoned me asking that I come at once to the hospital to see him about a matter of great importance. When I arrived there he said he had a typhoid epidemic of more than twenty cases on his hands. The other servants had jokingly nicknamed the cook "Typhoid Mary." She was out at the moment, but would I recognize her handwriting if she was really that woman? He handed me a letter from which I saw at once that the cook was indeed Mary Mallon, and I also identified her from his description.

I advised that the Health Department be notified, and it was not long before Mary was again taken and sent to North Brother Island. On this occasion she made no struggle.

Mary was on the island the second time for twenty-three years. During this long period she never once tried to escape. Did she want to regain her liberty after her second arrest? I believe she did not.

Some think she had come to recognize her condition as inevitable and had become reconciled to a life of imprisonment.

My belief is that a change had come over her — a change that was due largely to the passage of time. It was both mental and physical. She felt that she had been hounded because of typhoid fever. She did not admit that there was any typhoid about her, but since others said there was, she had not been allowed to go freely where she pleased and do what she wanted to do. As her lawyer had said, she had been advertised to the world as a dangerous person and had been treated worse than a criminal, and yet she had not been guilty of the least violence toward anybody.

Mary was now about forty-eight years of age and a good deal heavier than she was when she slipped through a kitchen full of servants, jumped the back fence and put up a fight with strong young policemen. She was as strong as ever, but she had lost something of that remarkable energy and activity which had characterized her young days and urged her forward to meet undaunted whatever situation the world presented to her. In these eight years since she was first arrested, she had learned

what it was to yield to other wills than her own and to know pain. In the last five years, although she had been free, there had been times when she had found it hard to fight her battles unaided.

On North Brother Island the City afforded her a comfortable place to live — a place where she could cook and sleep and read to her heart's content. Her old age was provided for. There was a good hospital with doctors nearby. She knew by experience that the people on the island would be kind to her. She knew she could keep them from talking about typhoid fever or asking questions about herself.

Mary possessed a violent temper against which, when fully aroused, few persons had ever been willing to contend. I had had this weapon used against me three times, Dr. Baker had seen it in full force on the occasion of Mary's first arrest, and there is a story of it when an English health officer, neglecting a warning he had received, undertook to interview Mary and photograph her at her bungalow. Mary knew how to throw herself into a state of what Dr. John A. Cahill, Superintendent of Riverside Hospital, called, "almost pathological anger."

In the many years of her incarceration, Mary made good use of this personal weapon. Usually a look or a word gave sufficient warning of what might lie behind. When, on the basis of a long and friendly relation, the head of the laboratory asked Mary to tell her about her love affairs, Mary silenced her with a glare.

When Mary returned to North Brother Island she had reason to think that if she showed she would not run away, she might get permission to visit the mainland, and could then see her old haunts in the East Thirty-third Street region, the shops and the streets and the other sights of the city. She could mingle with the crowd as though she belonged in it—as she felt she did.

Whether all this was planned by Mary I do not know, but the fact is she went back to her bungalow and made no fuss about it. She became a privileged guest of the City. Nobody ever talked to her about anything she did not want to talk about. She announced that her past life was a "closed incident," and nobody bothered her about it.

Mary was given a job in the laboratory and learned to make routine simple tests such as all hospitals require. She was paid well for what she did. When she wanted to, she could go to the mainland unattended, and when she came back, nobody made her give an account of herself. Sometimes she would go all the way over to Queens and make a long

visit to a family she knew there. They were not particularly glad to see her.

On Christmas morning, 1932, a man who came to deliver something to her found Typhoid Mary on the floor of her bungalow, paralyzed. She had had a stroke of apoplexy and never walked again. Thereafter, for six years, she was taken care of in the hospital.

She died November 11, 1938. Her body was hurried away and buried in a grave bought for the purpose at St. Raymond's Cemetery in the Bronx. There was no autopsy.

The official death certificate states that the diagnosis was terminal bronchopneumonia of seven days' duration, following chronic nephritis and chronic myocarditis of ten years' standing, and that the fact that the deceased had been a typhoid carrier for twenty-four years had been contributory.

The funeral possessed elements of irony as well as pathos. It was an odd climax to the curious career of this remarkable woman. It was held in the large Roman Catholic Church of St. Luke's, in 138th Street, the Bronx. Only nine persons were present. Of all those in the City employ who had known Mary Mallon and had seen her come and go for so many years, there was not one who followed her to her grave.

The total number of typhoid cases traced to Mary Mallon was fifty-three and the deaths, three. This is not a large toll, compared to the records of some carriers who have since been found. There were doubtless many cases produced by Mary that never came to light.

I could obtain only fragments of her history at the time of my connection with the case, and nobody else seems to have done much to find any more. But if there had been only the Oyster Bay outbreak that was proved to have been caused by her, it would have been enough to make her a woman of mark.

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BULLETIN OF
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NOVEMBER 1939

DISTRIBUTION OF ENZYMES IN TISSUE
AND CELLS

Harvey Lecture, March 16, 1939

K. LINDERSTRØM-LANG*

THE relationship between the sciences, histology and biochemistry is a rather distant one, however intimately may be connected the phenomena they describe in nature itself. On one hand we have the histologist's microscopic picture of a piece of tissue or of a cell with all its mysteries: formed bodies, nuclei, granules of different kinds, etc. On the other hand we have the multitude of things which the cells can do; the metabolic processes going on in their interior. Between these two aspects of the cells and the tissue formed by them there is a gap which it is the task of the histochemist and the histophysiologist to fill. The histochemist is assumed to be interested mainly in the distribution of matter in relation to the histologist's structural picture of the cells, while the work of the histophysiologist is concerned mainly with how chemical processes may take place at a given distribution of chemical compounds. The boundary between the two fields is not a sharp one but it may be said that the greatest progress in histochemistry has occurred in studies on distribution of chemical compounds, the histochemistry above

* Carlsberg Laboratory, Copenhagen.

all being a topochemistry relating histological structure to chemical composition.

We may speak of a qualitative and a quantitative histochemistry. In qualitative histochemistry, developed in the histologists' laboratories, the absorption or refraction of light, caused directly or indirectly by the different constituents of a cell, is observed in a microscope, either without previous treatment of the cell or after a more or less vigorous fixation and combination of the constituents with other chemical compounds, especially dyes (For references see Lison¹).

The quantitative histochemical methods are adapted mainly to the study of catalytically active constituents of the cell, i.e., its enzymes, and have features in common with ordinary biochemical technique. The elements of this procedure are the removal of small pieces of tissue or cells with known size and well defined histological structure and the investigation of these pieces by means of well-known chemical methods modified for the specific purpose of estimating small amounts of chemical compounds in small amounts of material.

This study of the quantitative topochemistry of enzymes is the subject of my lecture today. The problem is a fascinating, though very difficult one. The difficulties encountered are not so much connected with the chemical analysis of minute quantities of enzymes as with the histological side of the question. In other words, it is comparatively easy to find micromethods suitable for a rather detailed study of the distribution of enzymes, but it is extremely difficult to define, in a quantitative way, structural elements in cells or tissue to which the quantities of enzymes found may be referred. The ultimate aim of the histochemist interested in enzyme chemistry is to prove that certain portions of the cell — granules, vacuoles, nucleus, the cytoplasm proper — are or are not carriers of enzymatic activity. In general we must admit that we are far from a realization of this dream, in spite of the fact that more opinions have been expressed concerning this question than years of experimental work would justify; but even so, in a number of cases, the structure of tissue and cells may be sufficiently well defined to make profitable a comparison with the results of quantitative chemical analysis.

Firstly, cases may be mentioned where the question put to nature is simple enough to permit the histochemist to omit a closer cytological analysis. A problem belonging to this group is, for example, whether the two cells formed from a sea-urchin egg after one cleavage have the same

or different contents of a given enzyme per cell or per unit of volume measured under the microscope, or per unit of total nitrogen, determined by a micro-Kjeldahl method. Another example is the well-known problem of respiration in the animal and the vegetative poles of embryos. We deal here with histochemical problems of an especially simple type.

But also some cases of more difficult histochemical problems may be treated in a fairly satisfactory way. In tissue the number of cells of a certain type may be taken as a sufficiently defined structural quantity if their cytological condition is uniform or varies from cell to cell (of this type) in a way which is satisfactorily defined by the general physiological state of the tissue. An example of this is the problem of enzyme distribution in a secretory organ like the stomach mucosa where it has been possible to relate quantitatively the distribution of pepsin to that of the number of chief cells in stomachs of moderately well-defined and constant physiological state. If the physiological conditions are altered certain structural changes in the cells following their life cycle or functional cycle have to be considered, and it is very difficult to find a quantitative measure of such changes. However, I may mention that in such cases reference quantities may be chosen such as the cell volume—if the cell volume changes in a well-defined way—or the portion of the cell volume not occupied by granules, or the number or volume (if measurable) of granules of a certain kind, and so on as far as the histological methods of differentiation will carry us.

Similar reference quantities have to be considered in the case of experiments on single cells. As an example the experiments by Holter may be mentioned in which a quantitative relation was found in single sea-urchin eggs between peptidase content on the one hand and cytoplasmatic volume not occupied by granules on the other.

Before entering into details of these problems attention must be directed to a certain technical difficulty in comparing histological and enzymatic investigations. Many structures of the cell are not directly observable in the fresh tissue but only after fixing and staining. Hence, in a number of cases the two kinds of observation cannot be made on the same piece of tissue because the process of fixation is entirely destructive to the enzymes and, reversely, because the tissue is made completely unsuitable for histological investigation by the enzymatic analysis. In the following a few examples will be given of how this difficulty may be overcome.

After this, I fear, somewhat sketchy attempt to describe the topic of my lecture today, I shall proceed to give some examples from the work carried out during the past nine years by Dr. H. Holter, the author and our co-workers in the Carlsberg Laboratory. I am sorry that time does not allow me to deal in detail with the methodical side of the question, but it may be sufficient to give a rough idea of the manipulations in order to make the basis of the following investigations clear. Three essentially different kinds of methods were employed, one of which is by far the most used, viz., the microtitration method developed initially by H. Holter and the author.^{2,3,4,5,6} But in the last two years two other methods of investigation have been introduced, a dilatometric method developed in collaboration with Henry Lanz, Jr.^{7,8} and a gasometric method developed in collaboration with David Glick.^{9,10}

Fig. 1 shows in a schematic way the procedure in the titration method. By way of example a peptidase determination is described. A drop of water or dilute glycerine is introduced into a small reaction tube, volume 250 mm.³ The small piece of tissue is added by means of a fine glass needle. Five mm.³ of substrate (viz. an alanylglycine solution) are added. The micropipettes used are glass capillaries with two constrictions between which the volume is measured off. Next a stirrer is added consisting of a hollow and well-sealed glass bead filled with iron powder. The whole is mixed using an electromagnet with periodic circuit-breaker, the tube is closed with a stopper and immersed into a water bath at the temperature desired. When the enzymatic reaction has run for a suitable time it is stopped by adding alcoholic hydrochloric acid, then acetone with dissolved naphthyl red is added and the amino groups formed during the reaction are determined by titration with n/20 alcoholic hydrochloric acid, using a color standard for comparison. The stirring during titration is effected by means of the magnet with periodic circuit-breaker and the same small stirrer which remained in the reaction mixture all through the experiment. The burette is a capillary containing roughly 1-2 mm.³ per cm. and graduated in 0.2 mm.³ so as to allow an accuracy of reading of about 0.02 mm.³ Emptying and filling are effected by a fine screw at the lower end of the burette which forces a tightly fitting piston into an enlargement in the burette which is filled with mercury, thereby forcing a thread of mercury up into the capillary.

This method, modified for the specific purposes, has been employed

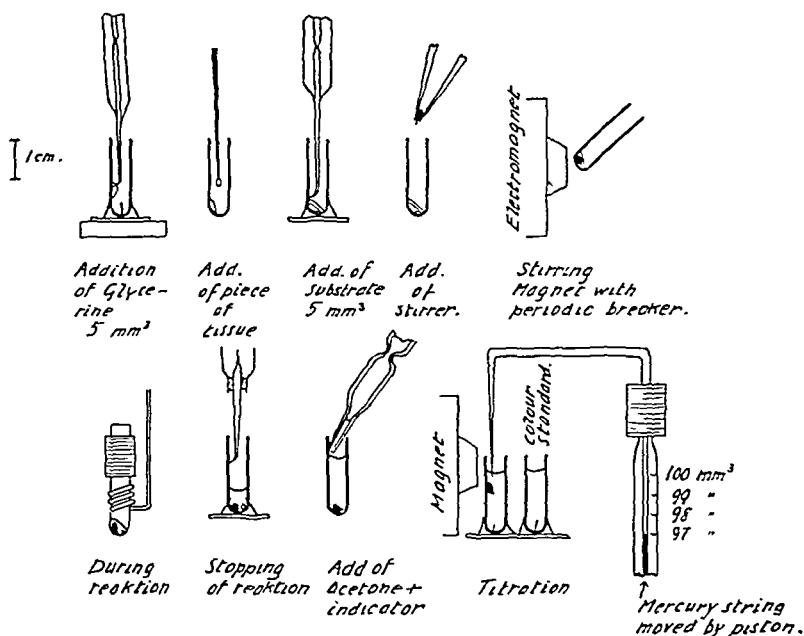


Fig. 1—Procedure in titrimetric estimation of enzymes.

for the determination of peptidases, proteinases, carbohydrases, esterases, etc. Its accuracy corresponds to $2.5 \cdot 10^{-9} - 5 \cdot 10^{-9}$ mol of substrate split. The accuracy of enzyme estimation varies from enzyme to enzyme and is furthermore dependent upon the time of reaction. With long reaction times small quantities of enzymes may sometimes be estimated accurately, enzyme destruction being the limiting factor here. As an illustration it may be mentioned that $5 \cdot 10^{-9}$ mol of alanylglucine is split by one sea-urchin egg in one hour.

Fig. 2 shows the main procedure in the dilatometric method which is based upon the well-known fact that chemical reactions in liquid systems are followed by well-defined isothermal changes in density. The density change per unit of time may be used as a measure of the rate of reaction.

To the left in a small scale is shown a so-called gradient tube in which the density is measured. In the upper bulb there is a mixture of kerosene and bromobenzene with the density 0.99. In the lower bulb there is another mixture of the same liquids with the density 1.01 and in the connecting tube the density varies linearly from 0.99 to 1.01. The whole system is saturated with water at a suitable vapor pressure.

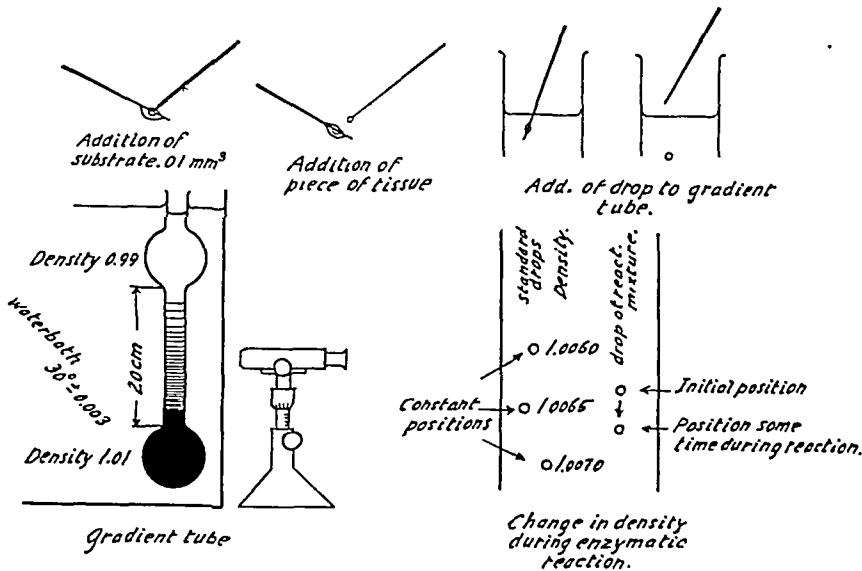


Fig. 2—Procedure in dilatometric estimation of enzymes.

If a drop of an aqueous solution is introduced at the top of the tube it will fall down through the medium and come to rest in a position where the density of the surrounding medium is identical with its own. Hence the density of the medium at any place may be determined by means of drops of known density and reversely the density of unknown solutions may be determined provided the gradient is standardized. The positions of the drops are measured in a horizontal microscope with micrometer.

The procedure in the enzymatic analysis is as follows. Again the peptidase determination may be used as an example. A drop of kerosene is put near the point of a glass needle. Into this drop a smaller one (0.1 mm.³) of alanylglcine solution is introduced. The aqueous solution sticks to the glass and is entirely covered with kerosene. The piece of tissue is added with a fine glass needle or with a small pipette (e.g., in case of a single sea-urchin egg suspended in sea water). The needle with its two drops is introduced into the medium at the top of the gradient tube, the kerosene dissolves in the medium and the aqueous drop is removed from the needle by lifting it above the surface of the medium. The drop falls down through the medium and would reach a position of equilibrium after about fifteen minutes if the tissue added were free of peptidase. If this is not the case the alanylglcine within the

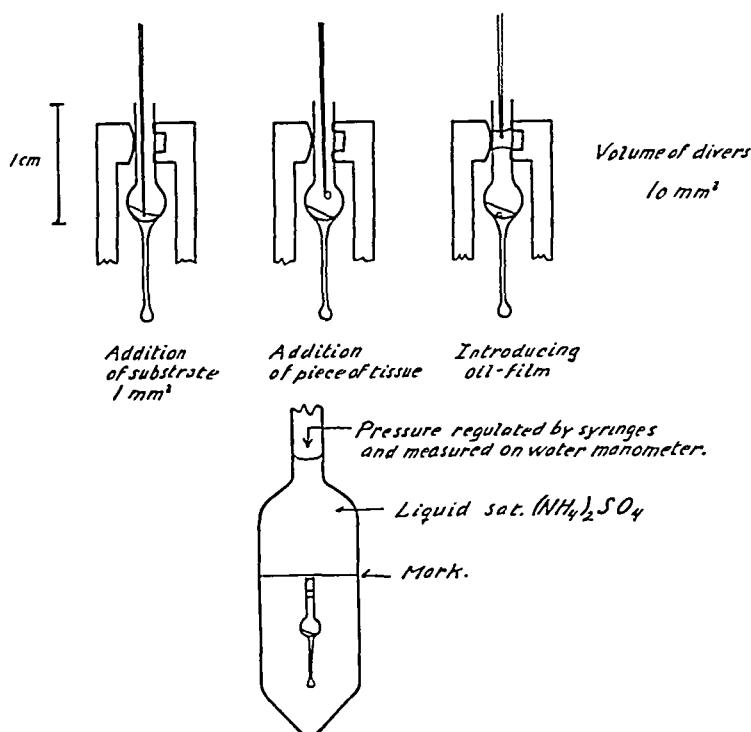


Fig. 3—Procedure in gasometric estimation of enzymes.

drop will be hydrolyzed and for each millimol of alanylglutamine split, a volume of 9.4 mm.³ will disappear. The density of the drop will therefore increase, the drop will not keep a constant position but will continue to fall very slowly to levels with increasing density. The rate of the fall is a measure of the quantity of peptidase. This is shown in the figure. The drops to the left are 0.1 mm.³ aqueous standard drops of known density introduced simultaneously and serving to standardize the gradient in the neighborhood of the drop of reaction mixture.

The accuracy of the density measurement is about $3 \cdot 10^{-6}$. In a drop of 0.1 mm.³ this corresponds to the splitting of $0.3 \cdot 10^{-10}$ mol of alanylglutamine. One sea-urchin egg will split this quantity of substrate in twenty seconds. That means that the peptidase content of 1/50 of a sea-urchin egg may be determined with an accuracy of a few per cent, provided all other sources of error are excluded.

Fig. 3 shows some details of the gasometric method. This method is based upon the principle of the cartesian diver well known from children's toys and from determinations of the density of liquids. In the

form employed for gasometric investigations the diver is a small thin-walled glass container, volume approx. 10 mm.³ Its gas space is closed by means of an oil film introduced into the neck. By adding or removing glass the weight of the diver may be adjusted so that at a pressure of 1 atmosphere it will just sink to the bottom of a vessel with saturated $(\text{NH}_4)_2\text{SO}_4$. This solution is chosen because it dissolves the ordinary gases only to a slight extent. At a slightly lower pressure, 20-40 cm. of water below one atmosphere, the buoyancy of the diver will counterbalance its weight and it is possible to adjust the pressure so as to bring the diver to swim at a given level (viz., the mark in Fig. 3) in the vessel and remain there for at least ten seconds. This equilibrium pressure is reproducible within 1-2 mm. water. If now for some reason the quantity of gas in the diver decreases or increases a corresponding change in equilibrium pressure will be observed and may be taken as a measure of the volume change since

$$\frac{\Delta v}{v} = \frac{\Delta p}{p}$$

where v is the gas volume of the diver and p the equilibrium pressure. An accuracy of pressure reading of 1 mm. water corresponds to an accuracy of volume determination equal to 0.001 mm.³ since p and v are of the order of magnitude 10,000 mm. and 10 mm.³ respectively. A determination of carboxylase, for example, may be carried out as follows. By means of a fine micropipette 1 mm.³ of a sodium pyruvate solution is pipetted down into the bottom of the diver which is held in a vertical position by a suitable holder. Next, the piece of tissue is added and finally the film of paraffin oil. The diver is introduced into the vessel below and sinks to the bottom. After a few minutes a slight under-pressure is put on the vessel and the equilibrium pressure is adjusted and read off. The readings are continued at suitable intervals, an empty diver serving as thermobarometer being measured at the same time. Between the readings the pressure on the diver vessel is brought back to 1 atmosphere. The change in equilibrium pressure corrected for the change in barometric height is then proportional to the quantity of CO_2 evolved. It is not necessary to stir during the reaction because the volume of the drop of reaction mixture is small as compared with its surface.

As an illustration it may be mentioned that the oxygen consumption of one sea-urchin embryo in 2 hours at 20° is just measurable with this method.

Experiments with such methods will—except in cases of more complex studies of metabolic processes (e.g., respiration)—furnish us with estimations of quantities of enzymes. The conditions at which the enzymatic reaction proceeds must be chosen so as to allow a calculation of the quantity of enzyme from the reaction rate. Here the histochemistry rests entirely on the results of general enzyme chemistry. It is important to point out that in most cases little or nothing can be said about the actual function in the cell of the enzyme estimated. An enzyme like peptidase estimated by measuring its catalytic effect on the hydrolysis of a peptide may in the cell have a quite different activity from that measured in the test tube at conditions most suitable for an *in vitro* experiment. It may even take part in synthetic processes.

Now concerning the sampling of tissue and cells, the requirement of histological control leaves two methods in the main:

1. *In vivo* observation of the histological structure of a given sample with succeeding enzymatic analysis of the same sample. If the object is not directly observable like sea-urchin eggs and other single cells of this type (protozoa, etc.), it is necessary to prepare the sample in a suitable form, e.g., in the case of tissue a thin slice in which counting of certain cellular elements or measurement of certain areas of homogeneous tissue may be carried out under the microscope.

2. Histological investigation on fixed and stained samples and enzymatic analysis of other non-fixed samples of the same object, under conditions assuring that the results obtained with the two sets of samples are mutually comparable. Figs. 4 and 5 show how this can be done in an exact way (Glick, Holter, Linderstrøm-Lang and Søeborg Ohlsen,¹¹ Linderstrøm-Lang and Mogensen¹²). A microtome of the Minot type is placed in a kryostat at -20° . It may be handled from the outside with two heavily lined leather gloves. A flat glass cuvette with warm water serves as a window and light is thrown down from the lamp above. A small cylinder with a diameter of 2 mm. is prepared from the tissue in question by means of a punch of a special kind. This cylinder is frozen on to the block of the microtome with its axis perpendicular to the plane of the block and cut in circular sections of suitable thickness (Fig. 5). In order to prevent the sections from curling up on the knife, which makes them unfit for histological investigation, a special device is constructed. Close against the side of the microtome knife farthest from the freezing block, a sheet of glass is placed and held at a distance of

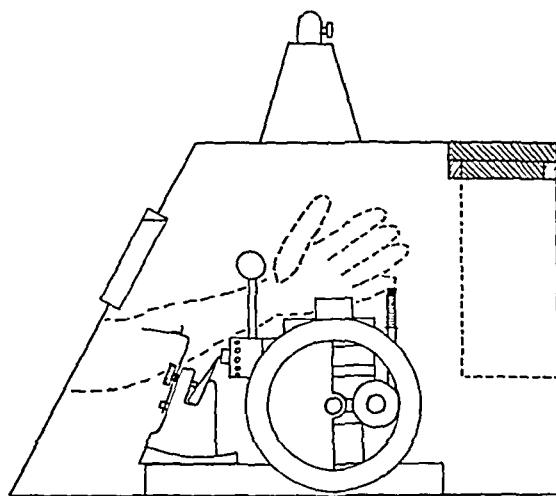


Figure 4

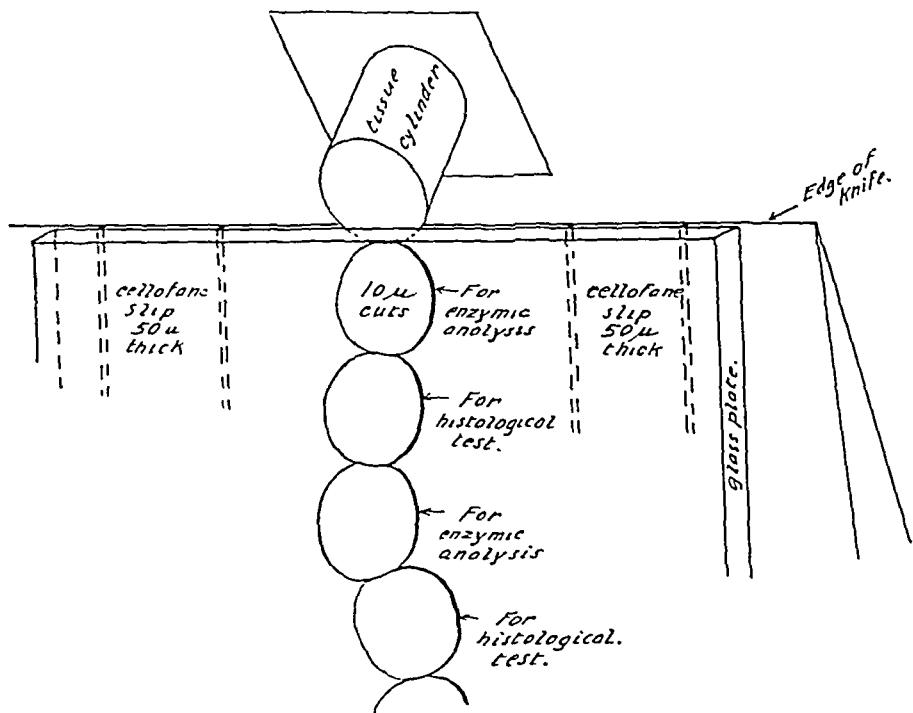


Fig. 5—Cutting of plane frozen sections of tissue.

50 μ from the blade of the knife by means of two strips of 'cellophane'. The sheet of glass can be swung back on an axis not shown in the picture and put in position again without displacement. It is important that the upper edge of the sheet of glass should coincide exactly with the edge of the knife. During the cutting process the glass is pressed down towards the knife and the sections slip between the sheet of glass and the knife and are thereby prevented from curling up. In this manner long series of plane 10 μ frozen sections can be taken, the volume of which does not vary more than 5 per cent. Such sections are well suited for histological investigation after fixing and staining. The comparison with enzymatic analysis is easy, the general principle being that indicated in Fig. 5. Alternate slices are taken for the two kinds of investigation and the distribution curves of the enzyme on one hand and of any histological quantity on the other are graphically compared, the distances from the surface of the cylinder being plotted as abscissae.

Entering now upon the application of these methods I must apologize for the rather scattered character of what I am going to say. The construction of a tool which may be used for many different kinds of work necessarily leads to a testing out of the tool on many problems with little mutual relationship except the one that they may be attacked by means of the tool. My only hope is that in hearing about these applications you may discover that certain problems of your own might advantageously be taken up on this basis.

HISTOCHEMICAL EXPERIMENTS

The problem of the function of the different cells building up the stomach mucosa is an old one and originates from the days of Heidenhain¹³ and Langley.^{14,15} The glands of the fundus part are built up in a way shown schematically in Fig. 6. At the top of the gland its wall is covered with epithelium cells. A little further down these cells give place to others, the neck chief cells and the parietal cells. Again deeper down the so-called chief cells appear while the neck chief cells disappear entirely and the parietal cells partly. Finally we pass beyond the basis of the glands and down into the muscularis mucosae, a fine membrane of connective tissue covering the outside of the stomach. Similar conditions are found in the pylorus part with the exception that the parietal cells are lacking. Due to this distribution of cells the mucosa has a definitely stratified structure and is exceptionally well suited for

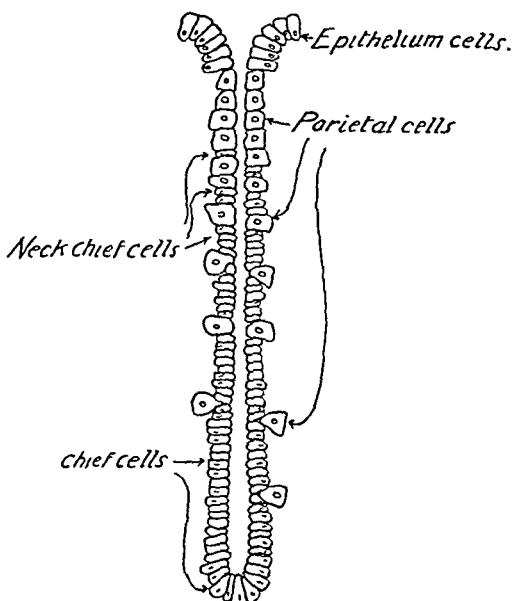


Fig. 6—Fundus gland of stomach mucosa.

investigations of the distribution of enzymes from the top to the base of the glands.

Fig. 7 shows the results of an investigation of this kind carried out six years ago in much the same way as just described (Glick, Holter, Linderstrøm-Lang and Søeborg Ohlsen¹¹). I shall not enter into methodical details since recently many improvements of technique have been introduced. A small tissue cylinder is punched out of the frozen mucosa of a swine in a comparatively well defined state of digestive cycle. Circular sections of 25μ thickness are cut and sets of two sections form the samples for the pepsin estimation. The upper light curve shows the results of the enzymatic analysis, arbitrary pepsin units per unit of volume being plotted against distances of the samples from the surface of the mucosa.

The lower curve shows the distribution of the number of chief cells, parietal cells and epithelium cells + neck chief cells per unit of volume. The upper heavy curve is constructed with the assumption that 1,000 chief cells contain 2 pepsin units which correspond to $1.4 \cdot 10^{-3}$ mg. Parke, Davis pepsin (1:10,000). It is evident from the agreement between the two curves that pepsin is accumulated in the chief cells and with a rather constant mean quantity per cell. This is supported by

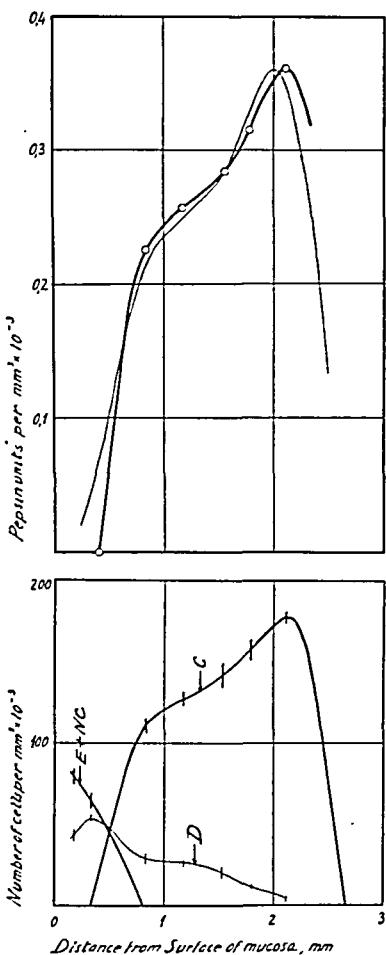


Fig. 7.—Pepsin and cell distribution in fundus mucosa.

several other experiments of similar type but with other stomach samples.

It may again be emphasized that from these experiments nothing definite can be said about the state or activity of pepsin in the cells. The enzyme experiments were carried out under conditions where the full activation of pepsin was secured. From other investigations, however, we know that pepsin is present in its inactive form, as pepsinogen. Hence it is more correct to say that the mean quantity of pepsinogen per chief cell is constant and much larger than the quantity present in any other type of cell. We are therefore justified in assuming with Heidenhain and Langley that pepsinogen is manufactured and stored in the chief cells.

Pepsin is not lacking, however, in other types of cells in the stomach.

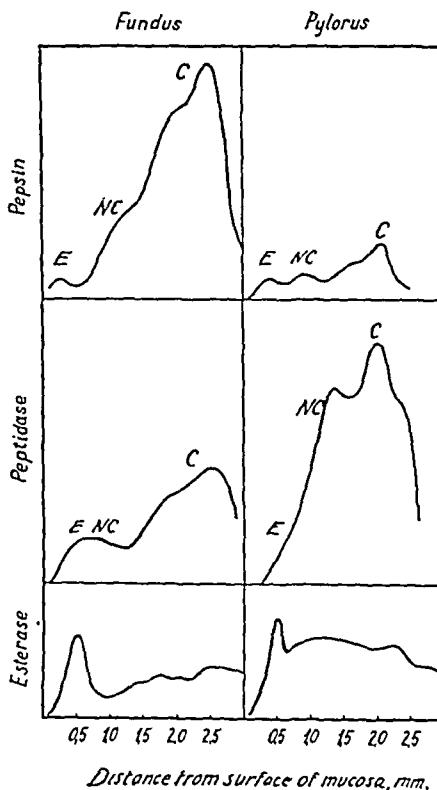


Fig. 8.—Enzyme distribution in fundus and pylorus.

The epithelium cells and the neck chief cells contain some pepsin. Roughly 0.1–0.2 pepsin units are found per 1,000 chief cells in the pylorus and even in the duodenum very small pepsin quantities are found in the cells of the Brunner glands. This pepsin of other cells differs from that present in the chief cells of the fundus in being more firmly bound to the protoplasm of the cells. Its function is quite obscure. The connective tissue, muscularis mucosae, etc., are free of pepsin.

A special chapter is the distribution of dipeptidase. It is present in the glandular cells in all parts of the stomach. The chief cells generally contain most; a little less is found in the neck chief cells and least in the epithelium. Muscularis mucosae is peptidase free. Comparing the chief cells of fundus and pylorus it is generally found that the peptidase content is the higher, the lower the pepsin content. Fig. 8 shows this. The letters indicate the cells dominating in the given regions. Since dipeptidase has never been demonstrated in the secretions of the stomach it may be regarded as a typical endoenzyme, the function of which is intimately connected with processes taking place in the interior of the

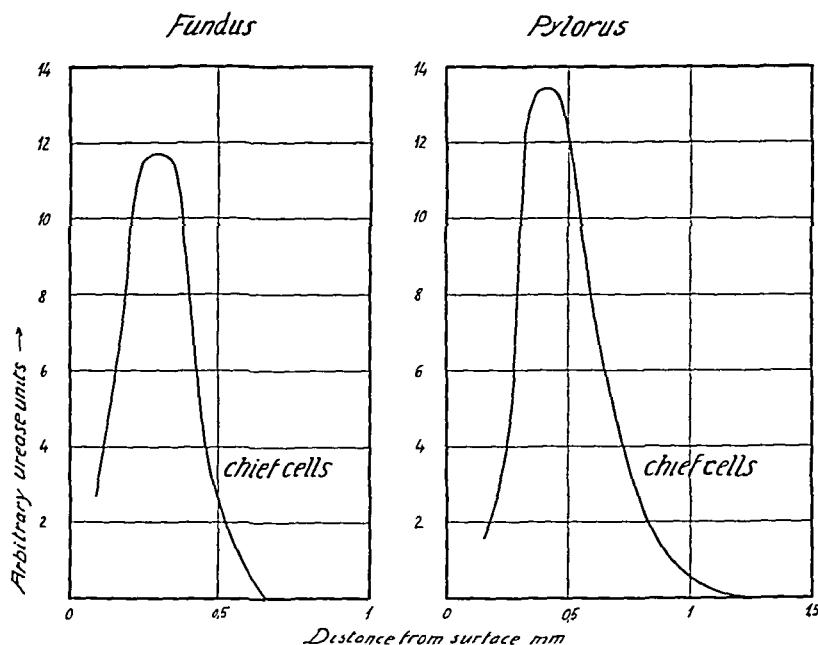


Fig. 9—Urease distribution in dogs mucosa.

cells of the secretory glands.

The curves at the basis of the figure show the esterase distribution (Glick¹¹). A high peak in the epithelium region may especially be noted but the conditions are rather complicated due to the fact that the connective tissue including the muscularis mucosae is rather rich in esterase.

Urease could not be demonstrated in the mucosa of the swine. But it is present in great quantities in the mucosa of the dog as found by Luck¹⁰. The distribution is interesting in as much as it is entirely different from that of peptidase. From Fig. 9 it is seen that urease is accumulated in a region just below the surface epithelium and that the chief cells are free of this enzyme. It has not been possible to correlate its occurrence with that of any definite type of cell (Linderstrøm-Lang and Søeborg Ohlsen¹⁷).

As an example of the enzyme distribution in another animal organ an investigation by Weil and Owen Ely¹⁸ may be mentioned. They studied the arginase distribution in the kidney of rabbits in much the same way as described above. Their results are seen from Figs. 10 and 11. The following types of cells were counted: The cells of the convoluted tubules; those of the ascending and descending Henle's loop tubules and of

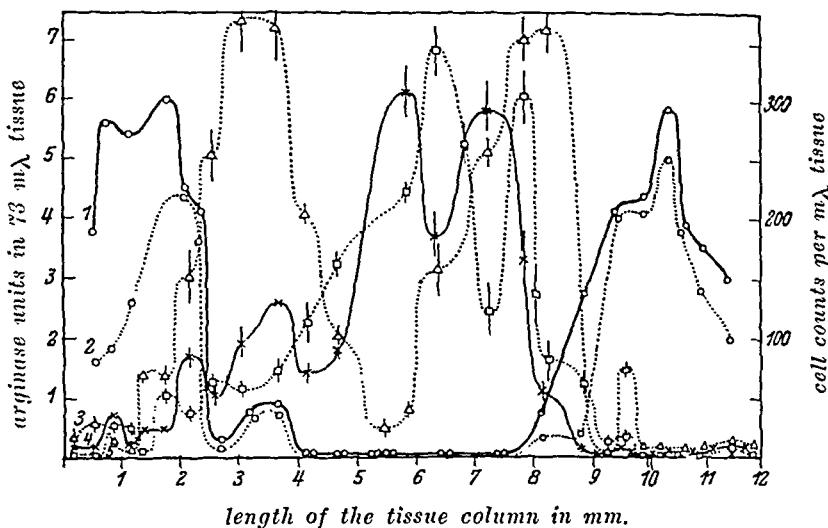


Fig. 10—Enzyme and cellular distribution in the medulla of rabbit kidney. Curve 1 shows the full activity of arginase; Curve 2, the initial activity of arginase; Curve 3, cellular counts of ascending Henle's loop tubules; Curve 4, cellular counts of descending Henle's loop tubules; Curve 5, cellular counts of collecting tubules. (Weil and Owen Ely¹⁸).

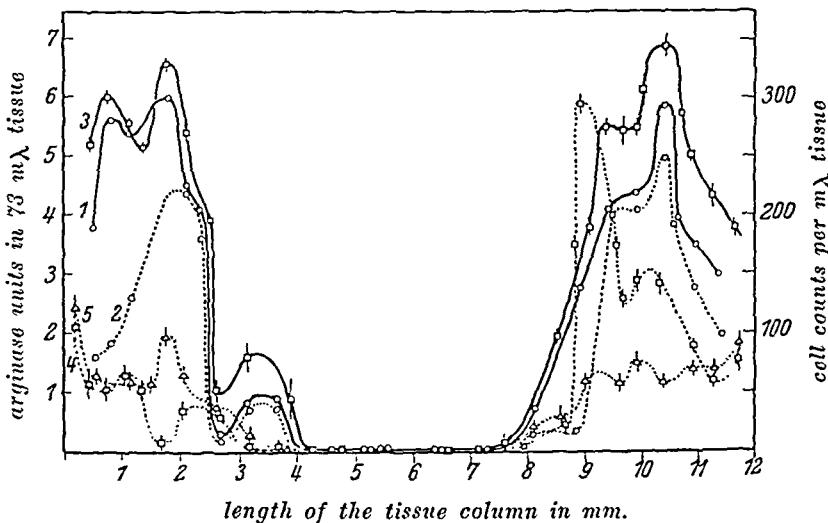


Fig. 11—Enzyme and cellular distribution in the cortex of rabbit kidney. Curve 1 shows the full activity of arginase; Curve 2, the initial activity of arginase; Curve 3, cellular counts of proximal convoluted tubules; Curve 4, cellular counts of distal convoluted tubules; Curve 5, per cent area of glomeruli tubules. (Weil and Owen Ely¹⁸).

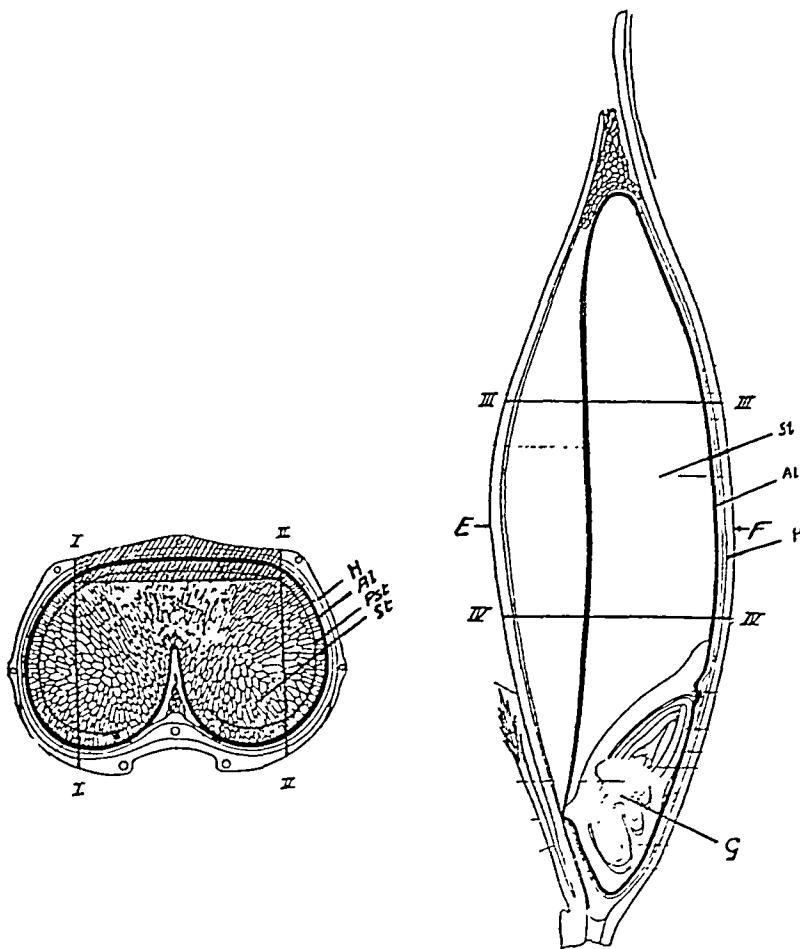


Fig. 12—Anatomy of barley grain.

Left: Transverse section E-F. I and II: limits of the cylinder. Al: aleuron cells. Pst: protein-rich starch cells. St: starch cells. H: husk. The hatched area was investigated.

Right: Longitudinal section. G: germ. III and IV: limits of the cylinder.

connecting tubules. The figures show that arginase is only present in the cortex and again here by far the best correlation is obtained between the distribution of arginase and that of the cells of the proximal convoluted tubules. This conclusive result, i.e., that the arginase is bound to these cells, is of great importance to the physiology of the function of the kidney.

Finally mention may be made of a short study of the amylase dis-

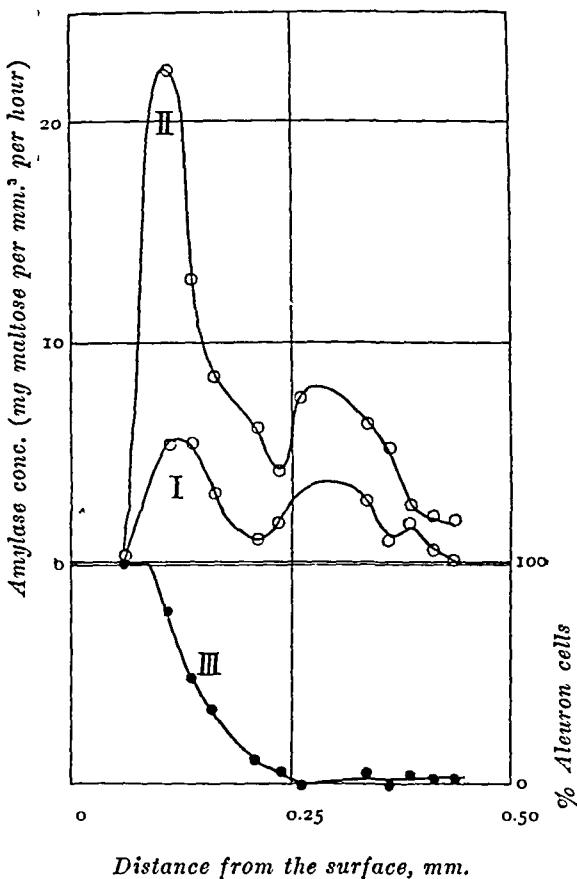


Fig. 13—Amylase distribution in barley grain.

tribution in the barley grain carried out in collaboration with C. Engel. Older experiments have shown that most of the amylase is found in the germ and here again accumulated in the palisade cells of the scutellum (Fig. 12). Another organ of the grain, the aleuron layer, is not so well known. It surrounds the endosperm except at the scutellum and borders inwardly on the starch cells. Its thickness varies from 1 to 3 cells. Some authors have found amylase in this layer, others have not.^{19,20,21,22,23} The explanation is that the amylase is accumulated in a very thin layer of small protein-rich starch cells filled with embryonic starch granules. This layer is situated between the aleuron cells and the real starch cells of the endosperm both of which are poor in amylase. In previous experiments the aleuron cells were removed from the grain by grinding off the surface layers of say 50 grains. Hence it would sometimes happen that the amylase-rich cells were removed together with the aleuron cells

and sometimes not. Fig. 12 shows how the renewed investigation was carried out. Again a small cylinder was cut out perpendicular to the plane defined by the longest of the small axes and the long axis, and 25μ sections were cut, photographed between two small pieces of cover slides and afterwards investigated for β -amylase. This experiment may therefore serve as an illustration of a case in which the same sample is used for a rough histological test and for enzymatic analysis. It may be pointed out that the amylase activity per section is so great that extracts can be made of each section and aliquots used for the analysis. This enables us to determine both active and inactive β -amylase, the latter being activated by papain-HCN.²⁴ Fig. 13 shows a distribution curve. Curve I represents the distribution of active amylase, curve II that of active + inactive. At the base of the figure the distribution of aleuron cells is graphically given. The ordinates represent the area of aleuron in per cent of total area of the slice, both areas being measured planimetrically on the enlarged microphotographs of the sections. It is observed that amylase is missing in the aleuron cells and that the starch cells, the quantity of which increases towards the right, are also poor in this enzyme. The optimum is found just at the boundary between these two types of cells and a more exact histological investigation has demonstrated the presence of the above mentioned thin layer of small starch cells.

CYTOCHEMICAL EXPERIMENTS

The study of single cells such as are found in the tissue of higher animals is strongly impeded by their small size. Hence the cytochemist has to look for other objects sufficiently large to permit him to dissect them and investigate the pieces with the available micromethods. The eggs of certain marine invertebrates, e.g., sea-urchins have for a long time served as experimental material for the cytologists, and preliminary experiments²⁵ showed them to be extraordinarily well suited for quantitative microenzymatic investigations. Their size is of the order of magnitude 10^{-4} mm.³ A property of great importance is the conformity in behavior of eggs of the same batch. Upon fertilization they will cleave almost simultaneously when kept at optimal conditions. If centrifuged according to the method of Newton Harvey they will stratify and divide uniformly. Their enzyme contents are nearly identical. Hence results obtained with portions of one egg may be compared with

TABLE I
CONFORMITY OF PEPTIDASE CONTENT IN UNFERTILIZED
EGGS OF THE SAME BATCH

SPECIES OF SEA-URCHIN	BATCH	NUMBER	QUANTITY OF PEPTIDASE IN ARBITRARY UNITS		MEAN
<i>Dendraster excentricus</i>	A	1	2.26	2.34	
			2.36	2.26	
			2.22	2.20	
			2.30	2.34	2.29
	B	1	1.68	1.76	
				1.60	1.68
<i>Psammechinus miliaris</i>	IV	3	4.31	4.25	
			4.25	4.11	4.24
	XII	3	2.46	2.50	
				2.70	2.55
<i>Echinarachnius parma</i>	A	1	3.36	3.16	
			3.04	3.26	
				3.30	3.22
	B	1	4.44	4.40	
			4.96	3.84	
			4.34	4.08	4.34
<i>Paracentrotus lividus</i>	A	1	5.94	5.82	
			6.30	6.12	
				5.92	6.02
	B	1	2.40	2.71	
			3.04	3.07	
			3.10	2.75	2.85

those obtained with another whole egg and the effect of the process of dissection may be controlled.

Table I shows the uniformity in peptidase content of eggs from the same batch. At the same time it appears that various batches may be quite different in this respect (Linderstrøm-Lang,²⁵ Philipson,²⁶ Holter²⁷ and unpublished data).

These eggs contain a number of formed bodies. There is the nucleus; a small body of chromatin. There is the yolk which fills up a considerable portion of the cell and may be regarded as "dead" material: protein, carbohydrate and fat serving as nutrition for the developing embryo. But in addition some granules are found which may be distinguished from the other formed bodies by their reaction with certain dyes. They have special interest to the cytologists and have several names. I shall

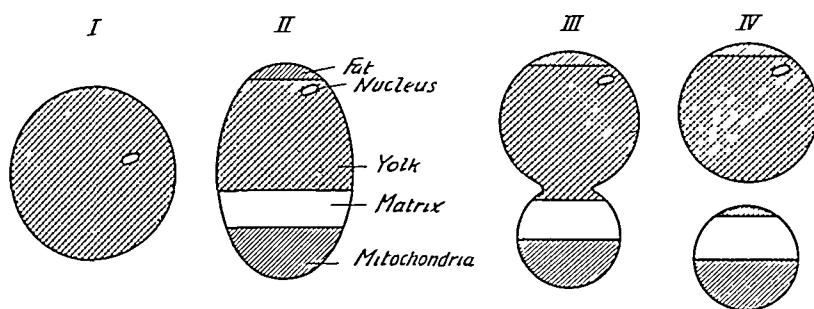


Fig. 14—Centrifuging of *psammechinus* egg.

refer to them as mitochondria. Their function in the cell has been much discussed and the plausible hypothesis has been advanced that they might be carriers of the enzymes of the cells (see Horning²⁸). The following experiments carried out by Holter a couple of years ago²⁷ tend to show that this is not generally the case. In continuation of preliminary investigations by Philipson,²⁶ Holter studied the peptidase and catalase distribution in centrifuged eggs of sea-urchins. Fig. 14 shows the behavior of the eggs of the sea-urchin, *Psammechinus miliaris*, in the centrifugal field. The method used was that of Newton Harvey²⁹ according to which a density gradient is made in a small test tube by partial mixing of sea water with an isotonic sugar solution. Eggs introduced into this tube will collect in a layer having a density equal to their own. During centrifugation of the tube the eggs first become elongated and stratified. Later on they take the shape of a dumbbell and finally they divide in two spherical portions. The distribution of matter appears from the figure. It is evident that an investigation of the enzyme content of the two portions must give information about the role of the mitochondria as enzyme carriers. Holter's results were as follows: Neither in the case of peptidase nor in that of catalase was it possible to correlate the quantities of enzyme found with those of any of the formed bodies including the mitochondria of the cell. The only correlation obtained was that between quantity of enzyme and the cell volume not occupied by formed bodies, i.e., the volume of the cytoplasm proper, the matrix of the cell. The calculation of this volume is not easy and involves an estimation of the free space between closely packed particles, but using the figures collected by Harvey a satisfactory treatment was possible. Table II shows some of the results.

TABLE II
ENZYME DISTRIBUTION IN CENTRIFUGED EGGS
HOLTER (1936)

ANIMAL	OBJECT INVESTIGATED	TOTAL VOLUME RATIO L/H	MATRIX VOLUME RATIO L/H	ENZYME CONTENT			L'H H'L
				BITARY UNITS PER ONE EGG OR PORTION	PEPTI-DASE RATIO L'/H'		
<i>Peptidase</i>							
<i>Arbacia punctulata</i> , Batch 1	Whole egg			0.446			
	Light portion, L	1.1	3.2	0.385	3.4	1.1	
	Heavy portion, H			0.098			
<i>Arbacia punctulata</i> , Batch 2	Whole egg			0.602			
	Light portion, L	0.6	1.2	0.323	1.3	1.1	
	Heavy portion, H			0.249			
<i>Echinarachnius parma</i>	Whole egg			3.22			
	Light portion, L	1.3	3.6	0.76	3.3	0.9	
	Heavy portion, H			2.52			
<i>Catalase</i>							
<i>Psammechinus miliaris</i>	Whole egg			12.0			
	Light portion, L	2.9	0.9	5.5	1.0	1.1	
	Heavy portion, H			5.3			

Similar results have been obtained with amebae (Holter and Kopac³⁰) and it seems to be a general rule that these two enzymes, dipeptidase and catalase, are found in the cells in a dissolved state. In the case of other enzymes like amylase, experiments by Holter and Doyle³¹ have indicated an accumulation in formed bodies of the mitochondria type, but more experiments must be done before this question can be finally settled.

Before entering upon a short review of embryological work carried out with the methods described I should like to mention some investigations on the intestine of the nematode *ascaris*. The experiments are not concluded, but seem to open up possibilities for a study of the cytochemistry of secretion. The intestine of *ascaris* has a lumen of about 1.5 mm. Its wall is about 120μ thick and consists of one layer of long palisade cells oriented perpendicular to the plane of the wall. Fig. 15 shows a cut

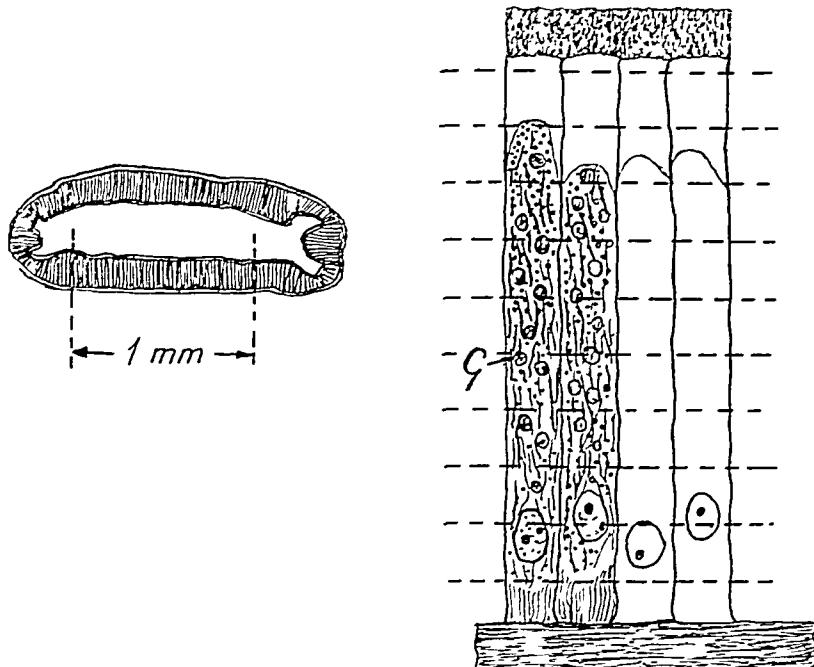


Fig. 15—Anatomy of *Ascaris* intestine.

through the intestine and, to the right, a piece of the wall cut parallel to the long axis of the palisade cells. According to Hirsch,³² it is possible in these cells to distinguish between different zones among which a central "working-zone" may be especially noted, characterized by the presence of so-called Golgi bodies, G, and assumed to be the place where the digestive enzymes are synthesized. Due to the uniformity of the secretional cycle of the cells in question a fair agreement is found between their individual cytological pictures in a given intestine. Hence it is possible by cutting the wall parallel to its surface to obtain a series of sections the structure of which is a representation of that of the single cells (compare Fig. 15): To the left the cutting out of a circular disc of intestinal wall 1 mm. in diameter; to the right the positions of eleven 10/_μ cuts obtainable from the disc.

The cutting is very difficult due to the loose and mucous character of the tissue. Furthermore, the angle between the plane of the intestinal wall and that described by the edge of the knife during its movement relative to the tissue should not exceed 1:100, otherwise skew cuts with complex structure would be obtained. Time does not permit me to go

more fully into the special technique developed. I should like to mention that the disc of tissue is frozen between two 1 mm. thick gelatin films and cut in the kryostat described above. The films are cast on a plane mercury surface in order to secure parallel surfaces. So far our experiments have demonstrated nothing but the presence of dipeptidase at all levels of the cells. But we feel certain that a closer analysis including other enzymes will bring interesting results. In addition we think that the technique developed may be of value in experiments on other thin membranes in the organism.

EMBRYOLOGICAL EXPERIMENTS

In the introduction mention was made of some experiments in which nature itself furnished the investigator with sufficiently defined samples for the histochemical analysis. In embryology the investigation is frequently restricted to a mere demonstration of chemical differences between the morphologically different parts of the embryo and does not include a comparison with more detailed differences in cytological properties.

As an example of such an embryological problem we may begin with the following simple question. Will the cells of a sea-urchin egg which has cleaved three times, with the formation of eight blastomeres, be identical with respect to their content of a given enzyme, say peptidase? We know that at this point of the development a differentiation has already taken place and that the two sets of four blastomeres are different from one another, their fate as animal and vegetative poles being determined. Preliminary investigations by means of the dilatometric method (Holter, Lanz and Linderstrøm-Lang³³) have shown that the peptidase is distributed evenly among the blastomeres and evenly between the two halves (comprising four blastomeres each). Table III shows this. The variations are probably within the experimental error.

Holter and Lindahl (unpublished data) have continued the investigation with the very enzyme-rich eggs of *Paracentrotus lividus* using the microtitration methods. They found an equal distribution of peptidase in the embryo (Table IV) through all the stages of the development up to the pluteus stage. Since the peptidase content of the whole embryo remains constant during the same developmental period Holter and Lindahl draw the evident conclusion that the peptidase originally present

TABLE III
DISTRIBUTION OF DIPEPTIDASE IN EMBRYOS OF
PSAMMECHINUS MILIARIS
Holter, Lanz and Linderstrøm-Lang³³

BATCH	OBJECT INVESTIGATED	PEPTIDASE CONTENT IN ARBITRARY UNITS
1	Whole egg unfertilized	675
	One-half egg (4 blastomeres)	365
	One-half egg (4 blastomeres)	338
2	Whole egg unfertilized	950
	One-eighth egg	88
	One-eighth egg	96
	One-eighth egg	98
	One-eighth egg	117
	One-eighth egg	89
	One-eighth egg	95
	(Two-eighths being lost)	

TABLE IV
DIPEPTIDASE DISTRIBUTION IN EMBRYOS OF
PARACENTROTUS LIVIDUS
Holter and Lindahl (1938)

STAGE OF DEVELOPMENT	OBJECT INVESTIGATED	CONTENT OF PEPTIDASE IN PER CENT OF THE CONTENT OF THE WHOLE EMBRYO	VOLUME IN PER CENT OF THE VOLUME OF THE WHOLE EMBRYO
16 cell stage	Animal half	50.6	50
	Vegetative half	49.8	50
Early gastrula	Animal half	51.5	50
	Vegetative half	46.3	50
Pluteus 60 hours	Ectoderm	81.6	82-81
	Entoderm	18.9	18-19

in the egg becomes equally distributed among all the cells of the embryo. Later on, of course, differences must occur since peptidase is not equally distributed in the fully grown animal. In this connection it is interesting to note that such differences have actually been found but with entirely different objects. Levy and Palmer³⁴ report the following unequal distribution in the case of chick-embryos:

Ectoderm arb. peptidase units per mm. ³	.	.	.	.	10
Mesenchym arb. peptidase units per mm. ³	.	.	.	.	3
Cerebral fluid arb. peptidase units per mm. ³	.....	.....	.....	.....	0

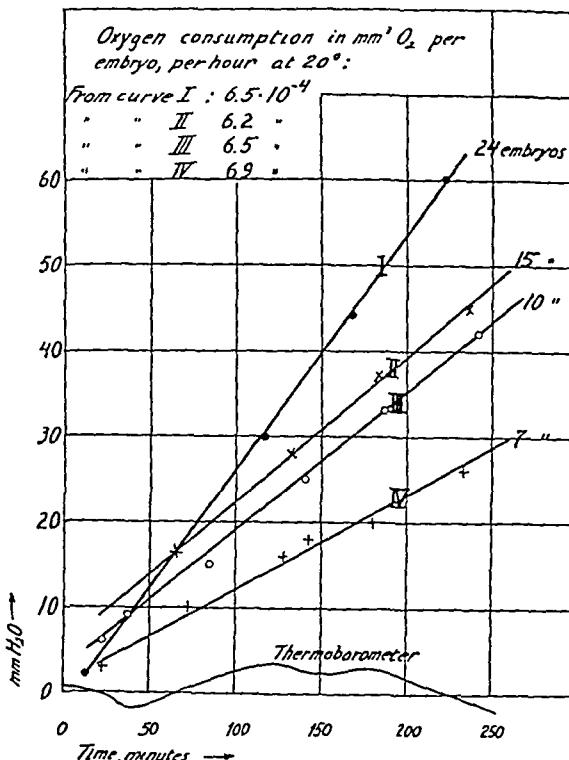


Fig. 16—*Paracentrotus* embryos (Holter and Lindahl).

Finally, an example of the application of the cartesian diver respirometer may be given. Studies on the respiration of embryos and parts of them have been carried out by Needham, Boell, Koch and Rogers;^{35,36} by Brachet and Shapiro³⁷ and by Holter and Lindahl (unpublished data). Respiration may be studied with the diver technique of a film of dilute sodium hydroxide serving to absorb the CO_2 formed as introduced in the neck of the diver below the film of oil. The organisms are placed at the bottom together with 1 mm^3 of a suitable medium (sea water, etc.). The advantages of the method in the case of embryological investigations are its accuracy and the circumstance that no shaking is necessary because the embryos in swimming around will stir up the small drops sufficiently. In addition, as many as six divers may be tended at one time.

Fig. 16 shows one of Holter and Lindahl's experiments with different numbers of whole embryos of *Paracentrotus lividus* in the early gastrula stage. The ordinates represent the pressure changes observed on the manometer corrected for changes in the atmospheric pressure. Each

TABLE V

RESPIRATION OF ANIMAL AND VEGETATIVE HALVES OF EMBRYOS OF PARACENTROTUS LIVIDUS

Holter and Lindahl (1938)

HOURS AFTER FERTILIZATION	NUMBER OF EMBRYOS OR PORTIONS OF EMBRYOS	OBJECTS INVESTIGATED T = WHOLE EMBRYO A = ANIMAL HALF V = VEGETATIVE HALF	OXYGEN CONSUMPTION IN MM ³ × 10 ⁻⁴ PER EMBRYO OR PORTION OF EMBRYO PER HOUR AT 20°
5	16	t	3.6
	15	a	2.0
	16	v	2.0
11	19	t	4.9
	30	a	2.8
	27	v	2.6
11	33	a	2.6
	36	v	2.2
	37	a + Lithium	1.3
	35	v + Lithium	1.3

millimeter corresponds to a volume change of about one thousandth of a mm.³ varying a little with the individual gas volumes of the divers. The time is represented in the abscissa. It appears that the respiration proceeds approximately linearly with time during the period of observation. Furthermore, closer calculation shows that the oxygen uptake per embryo per hour is the same independently of the number of embryos in the diver.

Experiments of this type carried out with animal and vegetative halves of embryos failed to demonstrate any difference in rate of respiration between these two portions of the embryos. Furthermore, the percentage inhibition by lithium ions was found to be identical in the two cases (Table V). It is evident that these results, though negative, will be of considerable value in the discussion of the relation between metabolism and differentiation.

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SOME COMMENTS ON ARTERIOSCLEROSIS IN WILD MAMMALS AND BIRDS*

HERBERT FOX

HIS opportunity is appreciated not only because it uses in your symposium some of the work that has interested us at the Penrose Laboratory of the Philadelphia Zoological Society and the Division of Comparative Pathology of the University of Pennsylvania, but also that it expresses your desire to know something of spontaneous pathology in other than human animals. This phase of study is still neglected, though less so than when Metchnikoff, forty-five years ago, wrote that pathology is almost the only subject of study in which the comparative method has been ignored. We could add that, even today with wisely selected methods, comparative pathology might many times lead to safer conclusions than would some of the bizarre mental and physical gymnastics of the experimentalist.

The first comment that can be made on our subject is that arteriosclerosis occurs in practically all vertebrates below man. We are concerned now with birds and mammals. Many Reptilia and a few Amphibia have been seen with this condition of the vessels. The second comment is that not only has arteriosclerosis been seen in menagerie specimens but also in material killed in the wild, that is, during the animal's free life.

As introductory to the form of disease seen in birds and mammals, it is desirable to define the forms that are recognized, which must be concise in such a short presentation, even though it appear dogmatic.

The simplest of arteriosclerotic change is intimal hyperplasia which amounts to a great excess of the normal widening of the intra-elastic layer that occurs in all animals as age advances. The second step in vascular disease seems to be atheroma, an excess of lipoid matter in the thickened intima, often minimal, at other times as in the monkey and eagle, dominating the statistical record of the variety. The next step is

* Read May 16, 1939, at The New York Academy of Medicine before the Section of Medicine.

degeneration in the media, be it simple hyalinization or as hardening when calcium is laid down. The greatest development is of course, atherosclerosis, a combination of all the essentials of the foregoing divisions.

The next comment that can be made is that all forms of arteriosclerosis occur in the lower animals. The most prominent lesions are in the major vessels but the small branches and of course arterioles, are sometimes similarly affected. The differing animal groups display their peculiarities of type, however. It is perhaps proper at this point to emphasize that I am speaking only of wild animals, not domestic ones that represent but few zoological groups and moreover have been artificially reared by man, prostituted to his use and are more truly wild in Nature's scheme of things than are ferocious beasts.

It is proper at this place to see the different lesions as they are found in wild animals according to the system already described.

In preparation for this presentation I have studied the available material since my last and general article that covered seven thousand animals. The results are almost identical as to type and distribution. The pictures amply reveal the damage in the arterial wall that can be accepted as nearly identical with the disease as known for man. Some phases of the process, such as renal or coronary sclerosis, do not lend themselves well to lantern slide reproduction and are at no time advanced; of this more later.

Table I demonstrates how the material was studied and may be used here to call attention to a few points for the appropriate comments. The figures for the Carnivora show that they have a tendency to intimal thickening and medial disease and that they give the highest figures for involvement of the small arteries, including vascular nephritis. This is not the case for the split-toed ungulates which have an arterial degeneration of the same type.

Attention to the birds easily discovers that the anserine and psittacine birds lead the list; others may have a higher percentage but have not supplied enough examples to deserve a sharp emphasis.

Real analysis comes from the totals for mammals versus birds. Here we see that arteriosclerosis has occurred at about the same percentage in birds and mammals, 15.4 and 13.7. The average exhibition time for the whole group respectively, sixty-one and sixty-nine months, and for those that had arteriosclerosis, respectively 134 and 137 months, is about as one is to two; the vascular group is certainly well ahead of the general aver-

TABLE I

ARTERIOSCLEROSIS IN MAMMALS AND BIRDS IN THIS STUDY

<i>Animal Orders or Families</i>	No. for Study	No. Arteriosclerotic	Percentage	Average Exhibition Time for Affected Orders	Average Exhibition Time for Arteriosclerosis	No. Intimal Hyperplasia	No. Atherosoma	No. Medial Degeneration	No. Atherosclerosis	No. Coronary Disease	Arteriosclerotic Type	No. Myocardial Disease	No. General Nephritis	No. Vascular Nephritis	No. Small Artery Disease
Cercopithecidae (Old World Monkeys) .	30	6	20	74	181	2	2	1	2	2	4	2	2		
Cebidae (New World Monkeys)	10	2	20	35	81		2				1	1			
Carnivora	71	9	12.6	81	183	4		3	1	1	1	2	4	4	
Rodentia	47	5	10.6	29	79	2		3	1	1	1	3		1	
Artiodactyla (Split-toed)	69	13	18.8	87	146	6	2	9	1		3	6	1	1	
Total Mammals	227	35	15.4	61	134	14	6	16	5	3	10	14	5	8	
Passeriformes (Nesting or singing birds of passage)	234	16	6.8	60	106	1	5		9	1	4	1		2	
Piciformes (Woodpeckers)	7	1	14.2	61	77		1								
Coraciiformes (Toucans)	8	3	37.5	87	222		1		2		1			1	
Psittaciformes (Parrots)	114	25	21.9	75	91	6	15	1	6		7	2		1	
Strigiformes (Owls)	12	2	16.6	31	77		2								
Accipitriformes (Eagles, etc.)	15	3	20	49	147		1	1	1			1			
Anseriformes (Ducks, etc.)	66	21	31.4	96	128	1	8		12	3	5	3	1	3	
Ardeiformes (Herns, storks, etc.)	13	3	23	100	116	1	3								
Baleariciformes (Cranes)	10	1	10	101	408				1						
Galliformes (Ground fowl)	100	5	5	33	134		3	1	1			1			
Total Birds	579	80	13.7	69	137	9	39	3	32	4	19	6	1	7	

TABLE II

ANIMAL ORDERS OR FAMILIES IN WHICH NO ARTERIOSCLEROSIS HAD BEEN SEEN AT THE PENROSE LABORATORY

Primates

Pongidae (gorillas and other apes)	20
Hylobatidae (gibbons)	13
Hapalidae (marmosets and lower Simians)	188
<i>Chiroptera</i> (bats)	12
<i>Lipotyphla</i> (hedgehogs, etc.)	10
<i>Coccygiformes</i> (cuckoos)	41
<i>Phoenicopteriformes</i> (flamingoes)	23
<i>Charadriiformes</i> (plover group)	40
<i>Lariformes</i> (gulls)	55
<i>Sphenisciformes</i> (penguins)	32
<i>Ralliformes</i> (gallinules and coots)	105

age. The average for those with arteriosclerosis being very good for menagerie maintenance, one might ask if the disease is good for the animal or is it just our usual reasoning that the animal has chanced to live long enough to get it. Is arteriosclerosis such a baneful form of the irreversibility of tissue?

The pathological features of mammals and birds are revealed in the totals, the immediately outstanding of which are as follows: mammals exceed sharply in intimal thickening and medial disease while birds have greater atheroma and full-fledged atherosclerosis. It must be recalled, however, that mammals do have this final form, as exemplified by the seal, the prominent exceptional case of which has been shown.

We have been dealing with so-called arteriosclerotic-positive varieties in menageries and it is fair to see the negative ones, Table II. Perhaps, had more examples been available, cases would have been found. We have seen the distribution of the disease in the animal scale, from primates to ratite birds and equally we see absence. We see quiet and restless varieties, we see carnivores and herbivores in both, we find that all spots of the zoogeographical earth are represented. It is notable that the bat and the gull are free and the passerine has much. If there be a group that is more affected than another, the quietly moving or the restless, it would probably be the former; the gentle duck and the dignified swan offer good examples; the busy-body monkey is not greatly affected.

TABLE III

LIST OF 'TRULY WILD ANIMALS' FROM THE WILD
THAT PRESENTED EVIDENCES OF ARTERIOPATHY

Chimpanzee	Intimal hyperplasia and atheromatoid swelling of the aorta
Chimpanzee	Atheroma of arch
Moustached Monkey	Slight medial degeneration
Phalanger	Medial musculo-elastic degeneration and free fat, in aorta and large extremity vessel
Tanager	Early medial disease
Thrush	Early medial disease
Parrakeet	Medial degeneration at root of aorta in sinus of Valsalva
Buzzard	Atheroma of lower half of aorta, with fibrillation of elastica
Buzzard	Medial degeneration of aorta near heart; atheromatoid thickening of intima at arch and upper thoracic
Mammals studied	63
Birds studied	153 } 216

One of the early comments was to the effect that arteriosclerosis occurs in "truly wild" as well as in menagerie animals. Table III shows a list of lesions found in animals sent to me by hunters and museum students in their naturalistic field work. The list is short and the percentage of findings is low but the essentials of arteriosclerosis can be discovered in animals uninfluenced by the so-called refinements of civilization. The lesions are not different from those discovered by a study of menagerie specimens.

Having surveyed the material upon which comments can be made, it is suitable that these remarks be continued by those that relate to our ideas of causation and effect. To approach a causation of a change one must know what the normal is and what it is at the various stages of youth, maturity and senility. Blood vessel walls, in common with other tissues pass through a change in structure. There occur a thickening of the intima, a fibrillary multiplication of elastic strands, a disarrangement of the elastic, muscular and cellular elements of the media, with possibly the appearance of fat. At least we believe that these are the accompaniments of inversive or irreversible anatomy and therefore of chemistry. These occur in man and lower animals. And there is nothing in the

gross and microscopic characters of arteriosclerosis that may not find its *qualitative* counterpart in the aging artery. The conditions then are differences of degree, or it may be more appropriate to state that those conditions that we call senile irreversibility of arteries merge into the disease of arteriosclerosis. This general condition holds for the lower animals but at varying rates or degrees. The conditions that affect the rate and severity of the process, such as medial degeneration of the cerebral human arteries or the major vessels of the bovine, are certainly acceptable as varied. The intimal overgrowth in the feline, the atherosis of the human coronary or the full-fledged process of the anserine vessel may be pushed along by another set of influences. Can we learn by comparative anatomy, physiology and pathology anything that would help to understand these inversive processes? Unfortunately little, but let us see. There are so many factors that their nature and influence must be sketched only.

The mammalian artery is closely similar throughout the Class albeit the carnivorous animals seem normally to develop heavy intimal layers at a younger age, appear to have a most generous elastic supply and a more robust muscular tissue than is the case with herbivores. In carnivores intimal hyperplasia stands first, then followed by muscular damage. The herbivores proper, bovines and cervines, for example, have as their major mural change, medial degeneration and then intimal hyperplasia; this might be related also to their more slender elastic supply and relatively thinner vascular wall. The intima of mammals appears to have greater power of growth and seems to be more often pathologically damaged.

Standing out in the relationship of anatomy and arteriosclerosis is the condition in birds. At the location where the most pronounced lesions are found in the bird, the aorta, a true well-formed internal elastic lamina does not exist. The intima is very delicate and normally grows little. The wall as a whole has relatively more elastic tissue and less muscle. The smaller vessels, as they become paler yellow-blue, have much muscle and an irregular strand of elastica just beneath the very delicate intima.

The bird with this vascular construction has atheroma and fully developed atherosclerosis in the major vessels and very little change in the smaller vessels. A very common seat for atherosclerosis in the bird is just above the heart, a place that feels the impact of the oncoming blood stream perhaps more than does any place of any vascular system

of any other animal. This force is given by a heart that is two and a half times the weight of that of a mammal of the same body weight.

These anatomies and these lesions occur. Are there variables in the anatomy of the human being that, in the presence of other factors favoring arterial degeneracy, predispose to the different forms of human disease? I would not mean that he who has renal arterial intimitis is a carnivore, he who has intermittent claudication from Mönkeberg's sclerosis is a herbivore or he who has full atherosclerosis is a bird, but their vessels might be abnormally constructed so as to favor these lesions.

Conditions of body, of size, of living characters, of sex, of known pathological panels such as susceptibilities to infectious disease and tumors, frequency of malnutrition, nostalgia, tractability, all these have no measurable effect upon the incidence of arteriosclerosis. That ever debated subject, diet, with its constantly shuffled alphabetical new deal, may have; let us hope that some one will find a capital V for vascular disease.

The food of the specimens of the first study was very high in carbohydrates, poor in protein, low in fat and ash and very irregular in vitamin contents. The second series received a balanced ration built around a formula of protein, two; fat, one; carbohydrate, five; ash, five; fortified by extra vitamins, by fruits, grains, vegetables and growing seeds. Despite the better balance of ration, greater vitamin content resulting in better exhibition specimens, arteriosclerosis has not changed essentially in appearance or distribution.

Comparative pathology is only good when it is applicable, as in our present case, to human medicine. The lessons from the vascular pathology of mammals and birds are limited but they exist. Perhaps it is fair to begin by emphasizing the principal differences between human and wild animal disease. Man has a small percentage of acutely fatal pathological processes but because he can nurse himself back to recovery, his major change may be called chronic pathology. Wild animals, especially as we are forced to know them best, die quickly when ill and their pathology is chiefly acute. Chronic cardiac, pulmonary, renal and similar morbid processes are uncommon. I think focal infection occurs in all animals, high and low, but I am loth to diagnose it.

For these reasons and some minor ones, the effects of vascular disease upon morbidity and mortality of wild animals are difficult to estimate. Insofar as atherosclerosis of the major vessel is concerned, it seems to

stand in exactly the position it occupies in human medicine. In man it assists in the end of senility. In lower animals it does the same. On a few occasions we have seen in Paradise birds atheroma and atherosclerosis in the sinus of Valsalva and rupture of the heart nearby. The worst cases of complete atherosclerosis, however, did not die from the vascular condition. They were among the examples that lived in the longest year-life brackets.

The Gull and Sutton concept is the one that requires our consideration and for this purpose we shall review the facts of the kidneys, heart and brain where the grave human lesions develop. What has been found has been at autopsy, our medical acumen and investigative facilities not reaching a nephrosclerosis in a bear.

Renal sclerosis of vascular type was found in 26 of 229 cases of the first series and in 6 of 115 of the second. I am not over-confident of the accuracy of the first figure but at all events the incidence of this form of arteriolar change is low. This sclerosis of the small vessels was associated with atherosclerosis of the large ones only in 6 of the total 32 nephroscleroses.

Coronary disease was diagnosed in the two series, nine times in all, of which three occurred in Paradise birds, and was almost certainly the cause of death. With none has there been a true infarction or major scar. Discovery of the extent of the lesion in small birds is difficult and has rarely been entirely satisfactory. Thrombosis on a roughened coronary place has been seen under the microscope but not grossly. Coronary shock can scarcely be called a frequent event in wild animal pathology.

Comment upon myocardial disease *per se* is best confined to our last series. Twenty-eight of the 115 arteriosclerotic bodies showed this lesion, usually as muscular fibrillation and fine fibrosis but also, notably in the old baboons and in parrots, a scar perceptible to the eye. True heart failure has not occurred from it.

Cerebral arterial disease can be dismissed with a few words. Never have we seen a massive cerebral hemorrhage of the apoplectic type. Many brains have been studied for diseased vessels without success. But then this is true with human material especially if one would try to find a vessel that is bad enough to break. On several occasions small arteries with vacuoles under the elastica or distorted as if the whole wall were about to become autolysed, were seen but no damage about them was found. Certainly none that suffered intimal herniation was seen.

Here we have a survey but not all the picture of arteriosclerosis in wild birds and mammals, an irreversibility of tissue chiefly in the major blood vessels, much less and with few dire consequences in their small vessels. The incidence is low, very much lower than for human beings. If the process be comparable to man's and become prominent as age advances, is it consistent to think of them both as inversive changes, that of man assisted by other chronic pathology? It is not to be forgotten that man suffers much chronic pathology, notably from infection and metabolic alteration, conditions quite rare in lower animals. And finally in this contrast, man and possibly lower animals suffer constant changes of blood pressure, a subject too extensive for this review, that can participate in the whole group of causes of tissue degeneracy.

A final comment would seem to be that arteriosclerosis is a failing of all animals and, as man has the most of it, perhaps he is the poorest.

Fox, H. Arteriosclerosis in lower mammals and birds; its relation to the disease in man, in: *Arteriosclerosis*, ed. by E. V. Cowdry, New York, Macmillan, 1933, pp. 153-193 (includes references).

PSYCHOLOGICAL STUDY OF THE MIGRAINOUS SYNDROME*

HERMAN SELINSKY

THIS psychological study of the migrainous syndrome is based upon material gathered from interviews with 200 patients who suffered for a number of years from recurrent paroxysmal headache, invariably hemicranial. These headaches were diagnosed as migrainous in character; for in addition to the characteristic headache, there were one or more accompanying symptoms: nausea, vomiting, visual disturbances, chilliness, and urgency in urination and defecation. None of these patients showed any signs of organic disease of the central nervous system. There was a ratio of four females to one male in this series. The presence of such factors as familial predisposition and allergic tendencies existed in the patients' histories to a high degree and were regarded as evidence of constitutional background. It is taken for granted that a physico-chemical mechanism serves as the organic vehicle for this syndrome. The investigations of Wolff and Graham¹ have demonstrated that the headache is related to a cranial arterial dilatation which usually can be controlled by ergotamine tartrate.

This communication has a two-fold purpose. First, to draw attention to the fact that the migrainous syndrome can be materially benefited by psychotherapy. Despite the writings of Touraine and Draper,² Harold Wolff,³ Olga Knopf⁴ and others⁵ who stress psychological factors, only two or three of these 200 patients whom I examined had possibly ever been approached previously from this therapeutic viewpoint. The other purpose of this paper is to attempt a dynamic concept of this psychophysiological problem. In passing, attention is called to a statement which Jelliffe⁶ made about the migrainous syndrome that my own experience has confirmed, namely, that the migrainous attack occurs in the general population much more commonly than is usually recognized. Dr. Wolff tells me this is also his impression.

* Read April 11, 1939 at The New York Academy of Medicine before the Section of Neurology and Psychiatry.

To illustrate the thesis of this paper, I shall cite briefly the history of a patient, as the pattern delineated in this simplified form is rather typical of that which is so often found in migraineous subjects.

The man, who is forty-one years of age, is employed as a decorator only seasonally. He is unmarried and lives with his widowed mother, his father having died when the patient was a child. The patient has suffered from periodic hemicrania for many years, but this has become extremely frequent and distressing for the past six months. The basic sources of his emotional disturbance are: 1. A constant fear of insecurity (connecting anxiety). 2. A morbid sense of responsibility about supporting his mother. He resents this burden and yet has not been able to modify his attitude about it. It is significant that he quarrels with his mother when he is not employed. His demeanor during the interview is that of an inhibited person who is rigid and guarded.

Let us study the train of events during a typically severe attack. The paroxysm is ushered in by a slight dulling of the intellect; then there is a dull pain over one part of the head, usually frontal, not uncommonly just above one eye. There is a feeling of dread about the advancing attack. The headache gradually increases in intensity tending to spread over a large area (hemicranial). The sufferer finds increasing difficulty in continuing his work as the headache proceeds; his intellectual faculties are more restricted as he becomes torpid and irritable. He finds light and sound disagreeable to an extraordinary degree so that he seeks seclusion in a quiet and dark room. He may express an offensive reaction to an odor in the room. He is chilled; his hands and feet become cold; and he may have tingling or numbness of the fingertips. Commonly he experiences nausea and often vomiting. He may have increased sphincter irritability, that is, frequency with urgency of urination or defecation or both; or he may have constipation which he may attempt to relieve by a cathartic or an enema to rid himself of some offending substance which he holds responsible for his ailment. Washing out the sinuses sometimes has a similar motive, i.e., to remove an offending substance. He may experience visual disturbances such as scintillating scotoma, but more often he complains of a blurring of vision. He may have a sensation of giddiness, and sometimes a ringing in the ears. If possible, he resorts to sleep, which usually alleviates the attack.

The entire picture is one in which the individual is graphically expressing an extraordinary inability to master some disturbing situation.

The attack indicates a markedly hyperesthetic reaction of the human organism to environmental pressure and to pressure from within. It seems that the peripheral sensory apparatus which is the mechanism that enables the organism to perceive, explore and thereby adapt itself to the environment is being strained to the point of agony.

It is reasonable to assume that great difficulty in meeting a situation may arouse mixed feelings of anger, discouragement, frustration and fear. Such reactions, in fact, are found on intensive study. Since he cannot master the environmental situation, the patient must find some compromise. This compromise may be considered to be achieved by the attack which makes it justifiable and necessary to withdraw from the confronting problem which he finds painful or intolerable.

Thus each symptom expresses dramatically the fearful helplessness and frantic effort to reject something offensive and insufferable to the ego of the subject which constantly is seeking harmony: to find a satisfactory balance between desires of the self and the environmental restraints.

To this theoretical explanation of the attack, the objection may be raised that this contention really stretches credibility. How can one know that the headache serves such a purpose? To this question, it must be admitted that one cannot be certain, but, if we view the behavior of human beings as systems of psychobiological adaptations, then the migrainous attack may be considered a protective device. This device is not desirable nor adequate, but it is the only adaptation which the individual can effect at that particular time with his equipment, which may be circumscribed by inhibitions as well as by biological limitations. The migrainous paroxysm is a faulty protective device, to be sure, but what shall we say of such a protective device as sham death which is observed in lower forms of life! One is reminded of the reaction of unicellular organisms such as the Paramecium or amoeba: the organism attempts to master the object in its path by engulfing or incorporating it; but should it prove undesirable, ejecting it or withdrawing entirely from it. As a psychobiological phenomenon, the migrainous attack represents an attempt to eject, reject and withdraw; the loss of consciousness marks the most intense effort to withdraw.

It is far from rare to get a history of at least one fainting spell following a migrainous attack when a survey is made of the individual's experience; and with some patients, loss of consciousness is a frequent mani-

festation. Among the papers of Hughlings Jackson⁷ and Gowers⁸ is found an opinion that migrainous and epileptiform states are related phenomena. H. A. Riley⁹ has observed this relationship in his extensive clinical studies of migraine.

In the explanation proposed by Kardiner¹⁰ to account for the syncopal reaction of the traumatic neurosis (complete disability of the executive ego functions induced by the repressed fright so that the adult individual feels helpless in attempts at mastery of the situation), one may find guidance in studying the migrainous reaction. This view is particularly reinforced by the clinical pattern in the patient who is experiencing increasing disability because the headache and its accompanying symptoms have become a daily burden. It is at this stage of the disorder that fainting spells are apt to occur. The daily headache indicates that the intolerable situation has remained unmastered and that the struggle is more intense (rebellion at the offending situation, yet inability to overcome it).

I have seen several instances of reaction to a difficult situation in which fainting attacks give place to constant headache as the external or internal pressure is somewhat relieved. For example, a woman had suffered from intense guilt feelings when her child, whom she had tried to do away with by taking various abortifacients, died soon after birth. Subsequently, as she was able to formulate an alternative explanation for the child's death, namely, incompetent obstetrical care, the fainting spells ceased, but she then suffered from constant headache. Also thereafter she remained sexually frigid.

In the migrainous subject we are dealing with an inhibitory reaction to an aggressive impulse which permits the suffering subject to withdraw from this situation. This psychophysiological reaction strongly suggests what Rado has so aptly termed the "riddance urge." The suffering of the patient also is conducive to evoking sympathy from others rather than angry retaliation which might be provoked by an assertive action.

Again, the role of the special senses is stressed for purposes of recapitulating the psychophysiological concept. These special senses serve defensive and aggressive aims in the organism's adaptation to the environment. They form part of the integrative apparatus of the nervous system. But, unlike more primitive species, the human being in our society cannot freely utilize motorial aggression against the challenging environment because there are moral or social forces which inhibit such impulses. Therefore anxiety is provoked with the fear of being over-

whelmed by the environment: overwhelmed if he remains quiescent, or, if he attempts violent action to overcome the offending source. The need for repressing such impulses repeatedly brings about a state of conditioned inhibited response and this provokes a migrainous attack, i.e., a retreat. The dulling of intellectual faculties which heralds the paroxysm may be regarded as a cortical inhibition due to the anxiety aroused, whereas the self-directed raging irritability of the organism can be hypothesized as a subcortical excitatory reaction. In these instances in which anger precedes an attack, the headache may be regarded as having a defensive or self-punishing aim. This seems to be a sort of apologetic expression in having lost one's self-control. Self-control is invariably a source of great pride in the migrainous subject; it is significantly related to the rigidity of the personality structure.

These paroxysmal headaches are particularly frequent in women with intellectual leanings and inhibited behavior. A very common situation is the role of migrainous headache in the life of the harassed housewife. The moral or ethical forces which have been inculcated in the upbringing of such women have made it impossible for them to deliver themselves of burdens which they inwardly rebel against, e.g., the bearing and raising of children under adverse economic conditions, and the constant drudgery of house work.

My observations coincide with the personality studies of migrainous patients by H. G. Wolff,³ Touraine and Draper,² Knopf,⁴ and others who have pointed out that the migrainous subject is often of an intellectual type with tendency to worry, rigidity of attitude, driving ambition, exaggerated sense of responsibility, marked sensitiveness to criticism, and meticulous attitude towards work or responsibility. Furthermore in women, there is usually impairment of ability to achieve sexual gratification. The thinking and behavior of those migrainous patients whom I have studied reveals what one might call an obsessional tendency. What is the significance of these characteristics? Each signifies a defensive trait and is a defense against a constant anxiety which is belied by the apparent self-assurance and self-control which migrainous subjects display. In fact, the attempt at self-control has operated to develop a rigidity about standards of achievement and behavior which originally were intended for defense against the basic insecurity but now have made the subject a prisoner within himself.

Touraine and Draper believe that the bout of headache represents a

struggle in the migrainous individual who is trying to "escape from the mother's influence yet there was a compulsion not to leave her." This view is somewhat in accord with F. Fromm-Reichmann's¹¹ hypothesis; she says, "Migraine is a physical expression of unconscious hostility against consciously beloved persons."

The insecurity which is the nuclear framework in the emotional background of these patients often produces dreams in which they express a longing for parental protection. But is it not a psychological symbolism which refers to the patient's desire to find more adequate support in his search for security from pressing problems which confront him? There is a struggle for independence with the spectre of insecurity intimidating the patient on the one hand and the individual urge to achieve freedom on the other. So that one may see alternating episodes of submissiveness or aggressiveness recurring in the mood of the subject as expressions of exaggerated reactions to these conflicting impulses.

These individuals display an excessive sense of responsibility which makes its appearance early in life, so that, for example, they are inclined to act as the main support for younger siblings or for ageing parents; or to contribute voluntarily to the support of indigent relatives. From this, they receive an ego gratification which incidentally it is difficult to make them see and accept as part of their motivation. Their basic need has been to strive inordinately and uncompromisingly for security, for it was regularly discovered in this study of migrainous subjects that they had experienced intense feelings of insecurity in their childhood. The insecurity may have been derived from a fatherless or motherless home, so that the child was given responsibility prematurely; or may have been engendered by sibling rivalry. In their strenuous attempts to adapt themselves to environmental handicap, they have reacted with character formations which gave them such appellations as "serious," "hard-working," "self-sacrificing," "good-hearted," "lacking in ability to play or relax." The women patients almost uniformly resented being female and naturally suffered a great deal during the menses. Many of them were frigid in their sexual reactions. The idea of self-control appeared dominant in their reactions to problems and this habit of repression led to a structural rigidity of emotional forces which prevented them from "letting themselves go." There was a frequent expression of hostility in women patients when referring to the mother, as though the patient felt that the mother's influence had been harmful or inhibiting. And, in fact, this resentment

could be justified when the mother's attitude was seen to be harsh or excessively repressive or apprehensive about the daughter's behavior.

SUMMARY

The migrainous reaction represents a psychophysiological reaction to a state of tension induced by a mental struggle or conflict. In this struggle, anxiety and resentment are prominent emotional forces, stirred up by the effort of the subject to master a presenting situation. There is a basic sense of insecurity in the background which the individual attempts to control by conscientiousness, ambitious striving and exaggerated sense of responsibility. The attack seems to represent inability on the part of the patient to react with mastery or decisiveness to some challenging problem. The seizure may be considered a physical expression of inhibited (unconscious) protest made in a morbid manner. The migrainous reaction is an ailment which often can be benefited by psychiatric study and therapy. The degree of psychotherapeutic success depends upon the patient's intelligent and persevering coöperation. It is our duty to apply accumulated psychiatric knowledge to the relief of these patients.

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DEATHS OF FELLOWS

GIBB, WILLIAM TRAVIS: 400 West End Avenue, New York City; born in Bellefonte, Pennsylvania, December 29, 1862; died in New York City, July 6, 1939; graduated in medicine from New York University Medical College in 1886; elected a Fellow of the Academy April 4, 1901.

Dr. Gibb was an instructor in chemistry at New York University Medical College, 1882-87, and in gynecology at that institution, 1887-95. He was gynecologist to the St. Elizabeth's Hospital, consulting gynecologist to the City Hospital and consulting surgeon to the Central and Neurological Institute, Welfare Island.

Dr. Gibb was a Fellow of the American College of Surgeons, a Fellow of the American Medical Association, a member of the Society of Medical Jurisprudence and a member of the County and State Medical Societies. He was the author of many works on gynecology and surgery.

HEITZMANN, LOUIS: 38 West 90 Street, New York City; born in Vienna, Austria, May 14, 1864; died in New York City, July 9, 1939; graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1885; elected a Fellow of the Academy June 5, 1890.

Dr. Heitzmann was emeritus professor of pathology of the New York Medical College and Flower Hospital, consulting physician to the Lenox Hill Hospital, a Fellow of the American Medical Association, a member of the American Urological Association and a member of the State and County Medical Societies.

STRATTON, EDWARD AUGUSTUS: 112 Liberty Street, Danbury, Connecticut; born in Danbury, Connecticut, November 8, 1861; died in Danbury, Connecticut, July 9, 1939; graduated in medicine from New York University Medical College, New York, in 1883; elected a Fellow of the Academy January 3, 1907.

Dr. Stratton was consulting surgeon to the Danbury Hospital, a Fellow of the American College of Surgeons, a Fellow of the American Medical Association and a member of the State and County Medical Societies.

CORRECTION • APRIL, 1939 BULLETIN

DIAGNOSTIC SIGNIFICANCE OF CHANGES IN LEUKOCYTES

M. M. WINTROBE

Table VI, on page 235 of the April, 1939, Bulletin is corrected to read as follows:

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TABLE VI

CAUSES OF LYMPHOCYTOSIS

1. Certain acute infections: pertussis
infectious mononucleosis
2. Exanthems, after the initial stage, especially in mumps and German measles
3. Chronic infections; such as tuberculosis, secondary and congenital syphilis, undulant fever
4. During the stage of convalescence from an acute infection
5. Exophthalmic goitre (usually only relative lymphocytosis)
6. Infants and young children, especially in the presence of rickets and malnutrition
7. Lymphatic leukemia

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BULLETIN OF
THE NEW YORK ACADEMY
OF MEDICINE



DECEMBER 1939

ADDRESS OF WELCOME
TWELFTH GRADUATE FORTNIGHT

MALCOLM GOODRIDGE

I am with a very real sense of pleasure and satisfaction that I extend to you the hearty welcome of the Academy of Medicine on this occasion. One of the objectives of the founders of the Academy, nearly one hundred years ago, was "The Cultivation and Advancement of the Science." With the founding of the Annual Graduate Fortnight, eleven years ago, we made a distinct contribution to the original aims of our forefathers.

I have heard the objection raised that postgraduate teaching is the function of the medical schools, and that in a short two weeks one could hardly do more than obtain some knowledge of the nomenclature of the subject under discussion.

I differ from those who hold such views. The New York Academy of Medicine is, first and foremost, an educational institution. The term, education, implies the acquisition as well as the imparting of knowledge; and it is the education we give ourselves which is the most valuable. If we are to read intelligently, we must understand the language we are reading.

I could not be convinced that the lectures, clinics, and exhibits ar-

ranged for previous Graduate Fortnights have not stimulated to further investigation those who have participated in its programs.

Tonight, we shall inaugurate our Twelfth Graduate Fortnight. The subject for discussion, this year, is, as you know, "The Endocrine Glands and their Disorders,"—a subject of great interest to almost every phase of medical practice. Indeed, the surgeon has made some of the most important contributions to our knowledge of the physiology and pathology of these glands.

The existence of many of the glands which we are about to discuss was known to ancient writers, and much of the groundwork of our present-day knowledge of endocrinology was laid in the nineteenth century. Nevertheless, our present-day conception of the subject is almost entirely a creation of the twentieth century. I mention this because it seems to me to emphasize the importance of this type of post-graduate teaching.

This year, you will note, we have added round table discussions to our program. You will find, in reading the names of the chairmen and leaders of these conferences, a sufficient guarantee of their potential value.

We are under great obligation to those men who are adding so greatly to the success of this Fortnight, by the contribution of so much of their time to the clinics, lectures, and round table discussions; and to the Committee on Medical Education, its subcommittee, and its executive staff, who have given so much of themselves, in terms of thought, time, and labor, in order that you might have a full measure of satisfaction during your attendance at the various exercises to be included in this Fortnight.

In closing, I hope I have made it plain that you will find a very warm welcome awaiting you at any of the clinics, round table discussions, and lectures you may desire to attend.

HYPOTHALAMIC-PITUITARY SYNDROMES*

LEOPOLD LICHTWITZ

THE hypothalamus is a central station in the autonomic nervous system for the control and regulation of vegetative functions. By its manifold activities the hypothalamus helps to maintain a constant internal environment. The conception of a constant internal environment we owe largely to the genius of Claude Bernard. The functional role of the hypothalamus in preserving the equilibrium has been well summed up by J. Barcroft,¹ who states "The physiology of the hypothalamus is the physiology of the internal environment."

The constancy of the internal environment depends upon a multitude of chemical and physical processes, such as secretions and excretions and their underlying metabolic requirements. Since metabolism is closely connected with endocrine secretion, regulation of vegetative functions must have a nervous as well as endocrinial character. It behooves us to understand the mechanism of this nervous and glandular coöperation.

The hormones, the powerful agents of the endocrine system, act in a definite order. This plan is carried out through the hypothalamic control of their production and release from the respective glands. The hypothalamus also plays a part in determining the degree of response to these hormones on the part of tissues and organs. The best known example of this type of hypothalamic control is the resistance to insulin in a diabetes originating from a hypothalamic lesion.

The hypothalamus responds to a large number of stimuli, such as temperature, osmotic pressure, pH; and is itself influenced by hormones. According to H. H. Meyer,² for example, the chief action of thyroxin is exerted upon the hypothalamus. In all probability the retarding influence of a number of endocrine glands upon the anterior pituitary is mediated by the hypothalamus.

The hypothalamus lies below the level of the thalamus, in the lateral wall and in the floor of the third ventricle from the posterior border

* Read October 24, 1939 at the Twelfth Graduate Fortnight of The New York Academy of Medicine.

of the optic chiasm dorsal, including the mammillary bodies. The posterior lobe of the pituitary may be considered a part of the hypothalamus; it develops from the floor of the third ventricle and as an avantguard brings the ectodermal anterior lobe into close contact with the hypothalamus. Thus anatomy and development indicate an intimate functional relationship between the hypothalamus and the pituitary.

The posterior pituitary lobe and the tuberal region of the hypothalamus (*Zwischenhirndrüse*) are the sources of various hormones. Whether they are produced within the pituicytes which represent modified ganglion cells, or in the epithelial sheaths covering the posterior lobe and the tuber cinereum, is a matter under discussion.

The pituitary-hypothalamic complex is responsible for a large number of symptoms, syndromes, and well-defined disease entities. Since the secretion of the anterior lobe rests under the command of the hypothalamus, it is practically impossible to determine which function or lesion is purely hypothalamic or purely pituitary in origin. The following table shows the chief functions depending upon hypothalamic-pituitary activity:

TABLE I

FUNCTIONS DEPENDING UPON HYPOTHALAMIC-PITUITARY ACTIVITY

- General metabolism
 - Carbohydrate metabolism
 - Fat metabolism and distribution of fat
 - Water metabolism (renal activity, sweating)
 - Thirst
 - Hunger and appetite
 - Growth and trophisms
 - Sexual development, maturation and activity
 - Cardiovascular activity (cardiac rhythm, blood pressure, vaso-motor balance, circulating blood volume)
 - Gastrointestinal activity (secretions, tonus, peristalsis)
 - Formation of erythrocytes, leukocytes, thrombocytes and plasma proteins
 - Regulation of body temperature
 - Sleep (hypothalamic only)
-

In order to avoid false deductions, it must be borne in mind that in this part of the central nervous system the anatomical localization of a lesion does not necessarily mean localization of a function (H. Jackson,³ Lhermitte⁴). The nuclear masses in the hypothalamus do not always represent well-defined centers by which isolated functions are controlled.

TABLE II
DISORDERS OF HYPOTHALAMIC-PITUITARY ORIGIN

High BMR	Low BMR	
Diabetes mellitus	Hypoglycemia	
Diabetes renalis		
Adiposity	Wasting (Cachexia)	
Lipodystrophy		
Fever	Hypothermia	Poikilothermia
Polyuria	Oliguria	
Diabetes insipidus		
Gigantism	Dwarfism	
Insomnia	Somnolence	
Pubertas precox	Delay and regression of sex development	
Arterial hypertension	Arterial hypotension	Vasomotor instability
Excessive salivation	Diminished salivation	
Gastric superacidity	Gastric subacidity	
	Achylia gastrica	
	Gastric-duodenal ulcers	
	Anomalies of gastrointestinal tonicity	
Polycythemia	Anemia	
Leukocytosis	Agranulocytosis	
Eosinophilia		
Osteoporosis	Eburnation	
	Arthritis	
Hirsutism	Alopecia	

The many pathological features enumerated in Table II may be grouped together into syndromes or well-defined diseases.

This rather imposing list is characterized by the large number of plus-minus variations, thus affirming the regulatory capacity of the hypothalamus.

The hypothalamus constitutes an essential instrument for emotional expression, normally restrained by cortical control. When in hypothalamic disorders cortical control is weakened or lost, emotional instability and abnormal behavior come to the fore. Emotional hypothalamic attacks are certainly more frequent than corresponds with the instances reported in the literature.

Hypothalamic-pituitary syndromes are brought on by four chief causes: Inherited or congenital defects, inflammation, trauma, and tumor.

Heredity plays an important role in the production of diabetes insipidus and of Froehlich's syndrome, the dystrophia adiposogenitalis. Encephalitis caused not only by influenza but all infectious diseases, and

also vaccination are of great etiological importance. Trauma and also surgical injury have been reported to be the cause in a number of cases. Leukemic infiltrations, Boeck's sarcoid, lymphogranulomatosis and xanthomatosis as well as primary or metastatic tumors produce the syndromes either by direct destruction of the tissues of the hypothalamo-pituitary territory or by pressure exercised directly or by an internal hydrocephalus.

The allotted time will not permit consideration of all the hypothalamic-pituitary syndromes. However, by discussing a few of them, namely, diabetes insipidus, abnormal ratio of growth with infantilism (infantile gigantism), and Froehlich's syndrome we may gain a general understanding of the underlying mechanism and of the possibilities of therapy. We may start with diabetes insipidus.

DIABETES INSIPIDUS

Diabetes insipidus originates from a disorder in the anterior hypothalamus and is controllable by the pituitary antidiuretic hormone, which is found and probably produced not only in the posterior lobe but also in the tuberal region of the hypothalamus. Therefore, total hypophysectomy need not eradicate the hormone and does not produce diabetes insipidus. Two factors underlie the genesis of diabetes insipidus, namely, absence of the antidiuretic hormone or failure of response to this hormone. Thus diabetes insipidus may exist in spite of a perfectly normal pituitary gland. It is generally agreed that physiologically the antidiuretic hormone acts on the hypothalamus itself. Of course, there is no doubt that experimentally and therapeutically the hormone is able to produce oliguria by direct action on the kidney proper and on capillaries generally. This universal action does not contravert anatomical, experimental and therapeutic evidence as to the direct influence of the antidiuretic hormone on the hypothalamus.

The nerve elements responsible for the control of the diuresis are well known. The paraventricular and supraoptic nuclei in the anterior hypothalamus are linked to the posterior lobe by the supraoptico-hypophyseal tract, abundant fibers of which take up a direct contact with the specific cells in the pars tuberalis and media. Another fiber tract runs between the tuberal nuclei and the posterior pituitary. These nuclei and the posterior lobe represent a functional unit. Destruction of the nuclei is followed by atrophy of the posterior lobe and destruc-

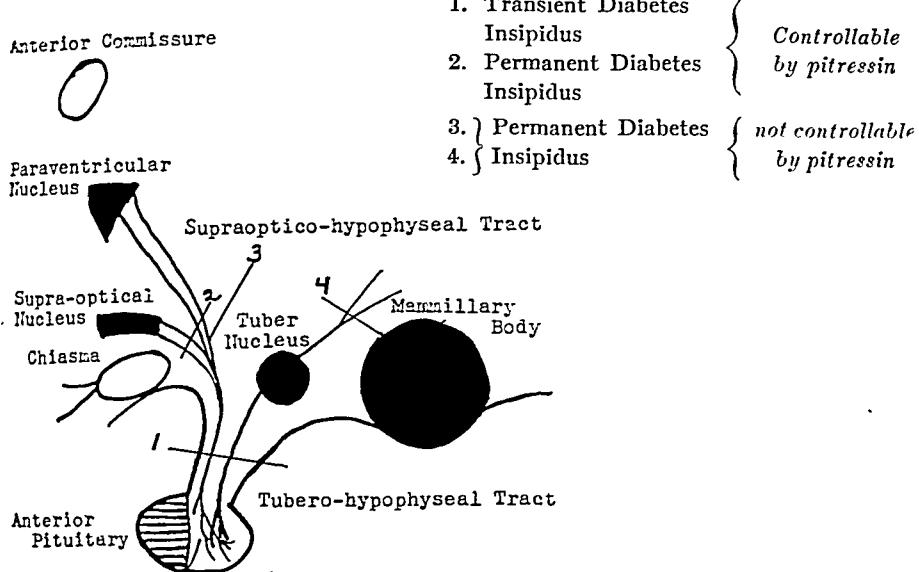


Fig. 1—The pituitary-hypothalamic control of diuresis.

tion or removal of the posterior lobe leads to atrophy of the cells of the nuclei. The destruction of the supraoptico-hypophyseal tract causes degeneration of the hypothalamic nuclei as well as of the posterior pituitary (Fisher, Ingram and Ransom⁵). Bilateral lesions within this system cause diabetes insipidus.

The investigations of Labb   and Az  rad,⁶ Dreyfus⁷ and Biggart⁸ indicate that the tuberal nuclei and the nerve tract running from these nuclei toward the mammillary bodies (tractus tuberalis descendens) possess a special importance in that lesions involving this tract render the diabetes insipidus refractory to the antidiuretic hormone.

The functional significance of diabetes insipidus lies in the fact that one of the most important renal functions is disturbed, namely, the ability of the kidney to retain water. In diabetes insipidus the excretory renal requirements cannot be fulfilled by means of a normal or small quantity of water. It is now well established that the extreme thirst of diabetes insipidus is not primary but that it is secondary to the uncontrolled diuresis.

Three types of diabetes insipidus may be differentiated. The first does not show any other symptom than polyuria. In these cases during a period of oliguria, easily enforced by the injection of the antidiuretic

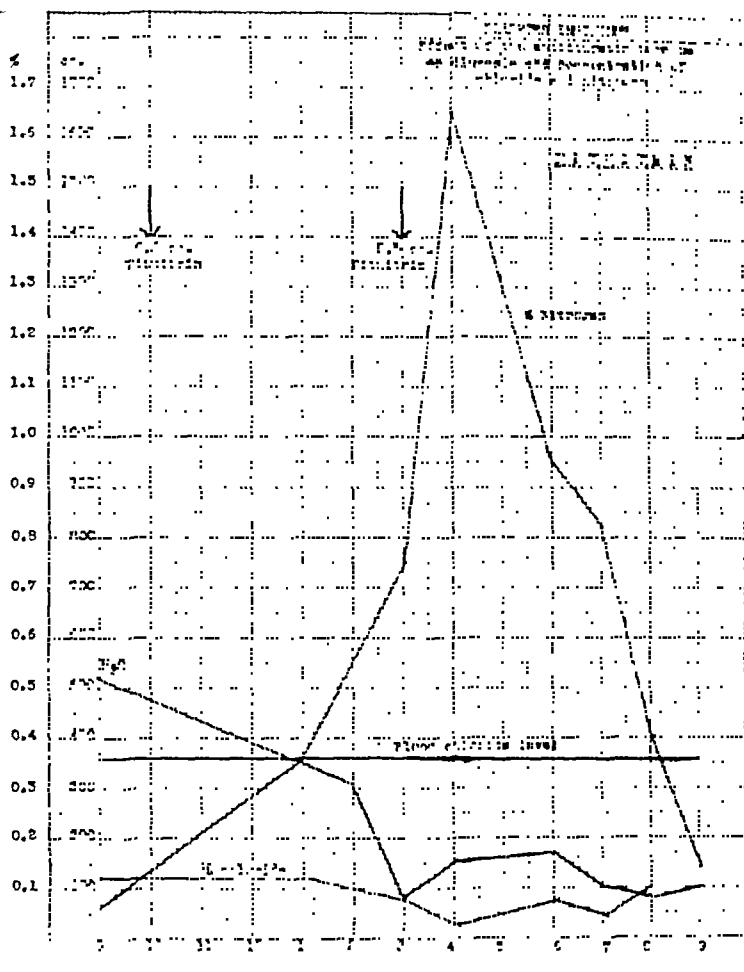


CHART I—DIABETES INSIPIDUS. Effect of the antidiuretic hormone on diuresis and concentration of chloride and nitrogen.

hormone, the kidneys reveal normal concentrating capacity. A second group is characterized by polyuria and failure in concentrating ability in respect to chlorides, bicarbonates and basic elements. Even in extreme oliguria the urinary concentration of chlorides remains unaltered—it may be as low as 100 mg. per 100 cc.—or at best it rises to the blood chloride level. Finally, there is a third type in which the polyuria decreases to inconspicuous figures, e.g., 2000 cc., but the failure to concentrate remains. This points to a hypothalamic apparatus of the concentrating power of the kidneys and its independence from the diuresis of water.

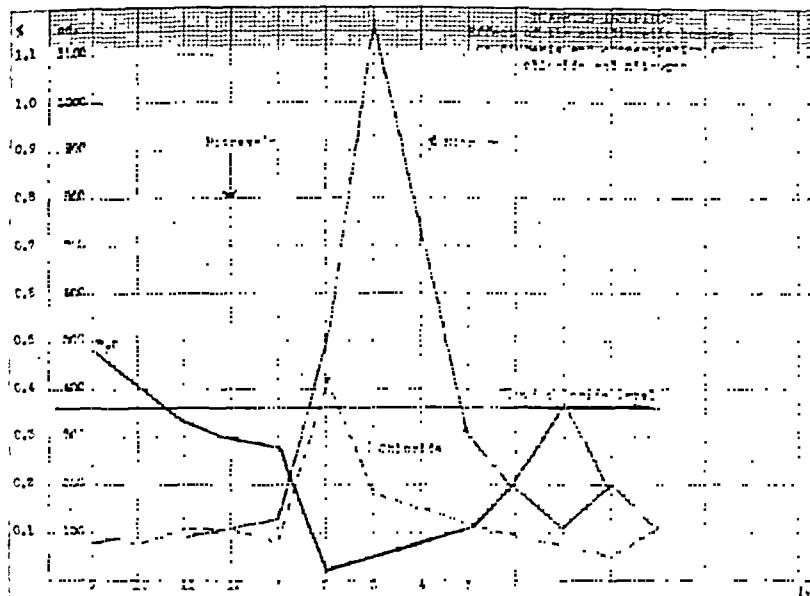


CHART II—DIABETES INSIPIDUS. Effect of the antidiuretic hormone on diuresis and concentration of chloride and nitrogen.

Diabetes insipidus may be a permanent or sporadic state, or may vary in degree, or may cease completely, just as is the case in diabetes mellitus of hypothalamic origin. In fact, even when caused by a most substantial pathological lesion, such as a metastatic cancer or a leukemic infiltration, the abnormality may disappear. This fact corresponds with experimental observations, according to which destruction of the posterior lobe or dissection of the pituitary stalk causes an increased secretory activity of the tuberal part of the hypothalamus and, therefore, a polyuria which lasts very briefly. The failure of the concentrating capacity also may be transitory in character.

Hann⁹ has advocated the idea that diabetes insipidus does not develop in the absence of the anterior pituitary, which, he believes, produces a diuretic hormone. There is no satisfactory proof of the validity of this conception. However, it seems likely that inactivity of the thyroid gland, which necessarily follows the absence of thyreotrophic hormone, may prevent or counteract the polyuria. Thus after total hypophysectomy diabetes insipidus can be provoked by the administration of thyroid extract. According to a case report by L. Strauss,¹⁰ diabetes insipidus

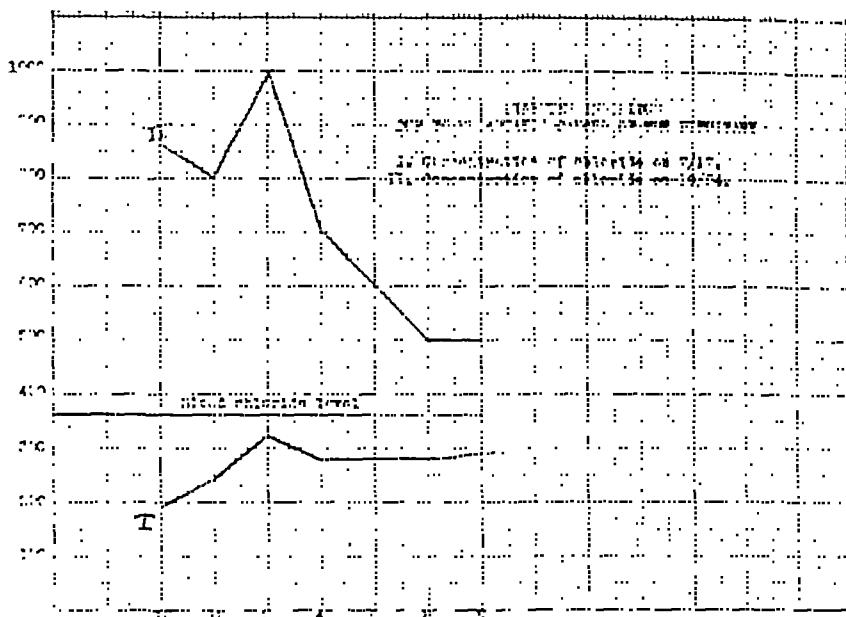


CHART III—DIABETES INSIPIDUS. Due to metastatic cancer of the pituitary. I, Concentration of chloride on 7/17. II, Concentration of chloride on 10/84.

disappeared after the development of myxedema, and T. Findley, Jr.¹¹ has found an increase of the effect of pitressin after thyroidectomy. These observations have led to an attempt to control diabetes insipidus by thyroidectomy. Good results have been reported in a few cases.

The functional character of diabetes insipidus is evidenced by the disappearance of the polyuria during fever, sleep, and anesthesia—conditions which temporarily change the activity of the hypothalamus.

It is well known that during sleep all the secretory and excretory processes are depressed. When this coöperation between the mechanism responsible for sleep and the control for secretory and excretory processes fails, nocturia, nocturnal salivation, night sweats and nocturnal gastrorrhoea result.

Etiologically we may differentiate as a separate group the idiopathic diabetes insipidus, which is frequently hereditary. In the famous family investigated by Adolf Weil,¹² of Heidelberg, and Alfred Weil,¹³ of New York, 35 of 220 members in five generations suffered from the disease which in this instance happened to be a dominant hereditary character. There seem to be no records of anatomical studies on the

hypothalamus and the pituitary in idiopathic diabetes insipidus. However, even though structural alterations should not be detectable, the frequent coincidence of diabetes insipidus with other hypothalamic disorders points to the hypothalamic origin.

In the majority of the cases polyuria is the only manifestation of the hypothalamic disorder and may last throughout life, the span of which is not shortened. After the age of fifty the disturbance frequently becomes less troublesome. Pregnancy has a definite influence, either decreasing or increasing the polyuria. Rest is beneficial. The prognosis does not depend on the degree of the polyuria, even when so excessive as 43 liters a day, as in a case reported by Trousseau.

Non-idiopathic diabetes insipidus is chiefly secondary to tumors and inflammatory pathology. Particularly in children infectious diseases, such as measles, scarlet fever, pertussis, diphtheria, chickenpox, mumps, erysipelas, influenza, and also vaccination may bring on a persistent diabetes insipidus. Xanthomatosis causes diabetes insipidus in 60 per cent and pellagra in 25 per cent of the patients.

The therapy may be considered from the viewpoint of the ways and means of influencing the hypothalamus generally. This principle may be exemplified on the basis of methods which influence heat regulation and at the same time water elimination.

The Viennese school of E. P. Pick¹⁴ has established the antidiuretic effect of antipyretics. Particularly aminopyrine has been used successfully in diabetes insipidus and has been seen to interfere with mercury diuretics. We have used aminopyrine against nocturia in cases of chronic mesencephalitis with good results, as shown in Table III.

It has been observed that in diabetes insipidus the polyuria may become diminished or even disappear during a period of fever. Fever induced by foreign proteins, or other substances, may have the same effect. Here the rise in the temperature originates in that part of the temperature center which controls the production of heat. The rise of temperature brought on by hot baths, the fever machine, or other means, is quite different in its mechanism, for here the apparatus designed to get rid of heat becomes active. The diuresis may be diminished by either mechanism or by both.

The chief agent for the treatment of diabetes insipidus is the anti-diuretic hormone. It is available as the extract of the posterior and of the intermediary pituitary. Pitressin applied subcutaneously may produce

TABLE III
EFFECT OF AMINOPYRINE ON NOCTURIA

CASE	TOTAL URINE CC.	REDUCTION OF THE DIURESIS [PER CENT]	URINE		NOCTURIA IN PERCENTAGE OF TOTAL	AMINOPYRINE
			DAY	NIGHT		
I	2570		770	1800	70	
	1720	33	1070	650	30	++
II	2130		530	1600	75	
	1495	30	845	650	43	++
III	2360		860	1500	63	
	1050	56	870	180.	17	++

oliguria for a period of 4 to 6 hours but sometimes for 24 or even 48 hours. In a small number of cases thirst is a hypothalamic symptom independent from the polyuria and not influenced by the antidiuretic hormone. In such cases treatment with antidiuretic hormone is contraindicated because the patient, continuing to take in large quantities of fluid, but unable to excrete corresponding amounts of urine, may become dangerously ill from a syndrome which has been termed "water intoxication." In another group of cases the vasomotor effect of the posterior lobe extract may cause considerable discomfort. In that event an extract of the intermediary lobe may be tried. In 1922, H. L. Blumgart¹⁵ introduced the intranasal application of the antidiuretic hormone. This method is more effective and certainly more convenient than the subcutaneous route, provided the patient's snuffing technique is good and he can stand it without getting nasal catarrh. The nasal application of 50 mgms. of the extract is sufficient in most cases. The smallest effe-
ctual dose should be established and administered as frequently or as rarely as necessary.

According to reports in the literature, follicular hormone has been helpful in a number of cases. This effect is creditable since we know that this hormone and others counteract the activity of the anterior lobe acting via the hypothalamus. In diabetes insipidus it seems essential to depress the anterior lobe and consequently the use of anterior pituitary hormones and particularly of the thyrotropic hormone is contraindicated. This also applies to the thyroid hormone because of its diuretic

effect. An attempt may be made to depress the thyroid secretion by administering diiodotyrosine. The use of sedatives is to be recommended and may be combined with atropine and aminopyrine, particularly in cases resistant to the antidiuretic hormone. Antisyphilitic treatment will be successful in suitable cases. Removal of 8 to 15 cc. of spinal fluid by spinal puncture is recommended by Herrick and may be of value particularly in cases with increased intraventricular pressure.

DYSTROPHIA ADIPOSOGENITALIS

Dystrophia adiposogenitalis, Froehlich's syndrome, is another pituitary-hypothalamic syndrome of major importance. It is characterized by obesity and failure or delay of sexual development. There is in New York City a particularly large number of individuals of this type, who show a strong hereditary and familial trend. Groups of human beings—I purposely avoid the misinterpreted and criminally applied term race—in which there is a tendency to obesity, as for instance in the peoples originating from Southern and Southeastern Europe and Asia Minor, seem to produce a relatively larger number of individuals of the Froehlich type.

It should be borne in mind that height and weight are stigmata of pituitary-hypothalamic origin and that the change in height which has taken place in the last twenty-five years, points to an evolutionary change in pituitary-hypothalamic activity. This last period has produced a larger number of tall individuals with long limbs and a relatively short torso, on which is perched a small head with a long face. The disproportionate growth of the limbs is caused by the delay in sex maturation. This type of abnormal ratio of growth with infantilism (infantile gigantism) represents a pituitary-hypothalamic anomaly linked to the eunuchoid type. Its somatic characteristics are paralleled by a definite mental pattern. These individuals are emotional rather than rational and are governed by sentiment rather than by reason. They have little stability, lack self-confidence and dread to assume responsibility or to face the world alone. Hence they are easily herded by a man who claims to be their leader, holding out to them prospects of green pastures and greatness. It is interesting that in the present Germany this infantile gigantism is portrayed as the ideal of manhood and knighthood in the statue of "Siegfried." (Fig. 2)

Dystrophia adiposogenitalis is usually congenital. The endocrine

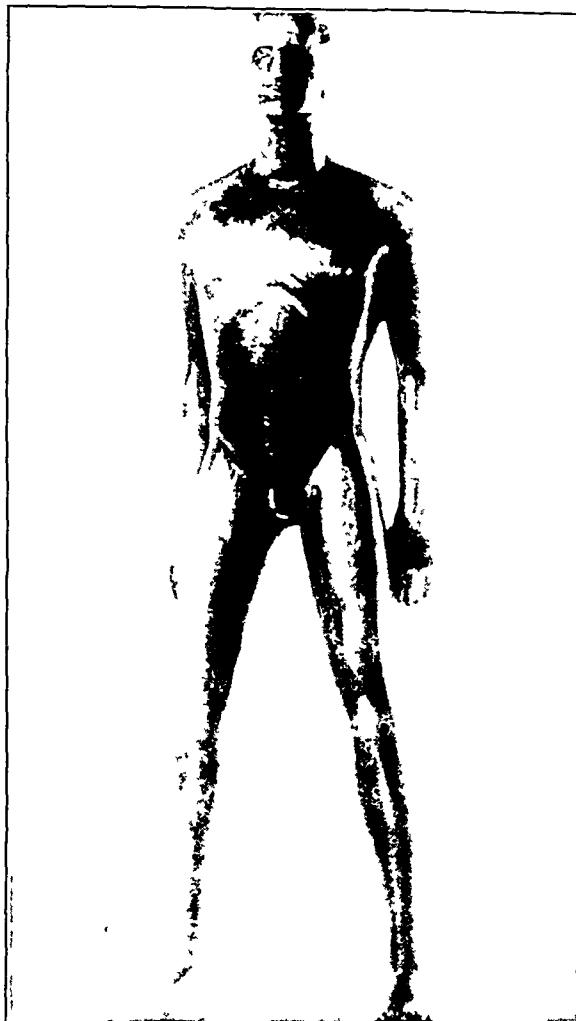


Fig. 2—"Siegfried" statue in present day Germany shows the characteristics of infantile gigantism.

and nervous origin of the outstanding symptoms—adiposity and sexual retardation—have been clarified in recent years. According to P. E. Smith,¹⁶ destruction of the anterior pituitary causes atrophy of the gonads but not adiposity. Obesity results from basophile and chromophile pituitary adenoma. Cushing¹⁷ found rapid increase in weight with amenorrhoea in 60 per cent of females with chromophile adenoma before pressure on the optic chiasm became apparent. However, obesity of hypothalamic origin is equally well known ever since O. Marburg¹⁸ described the first incident in a case of internal hydrocephalus (1907).

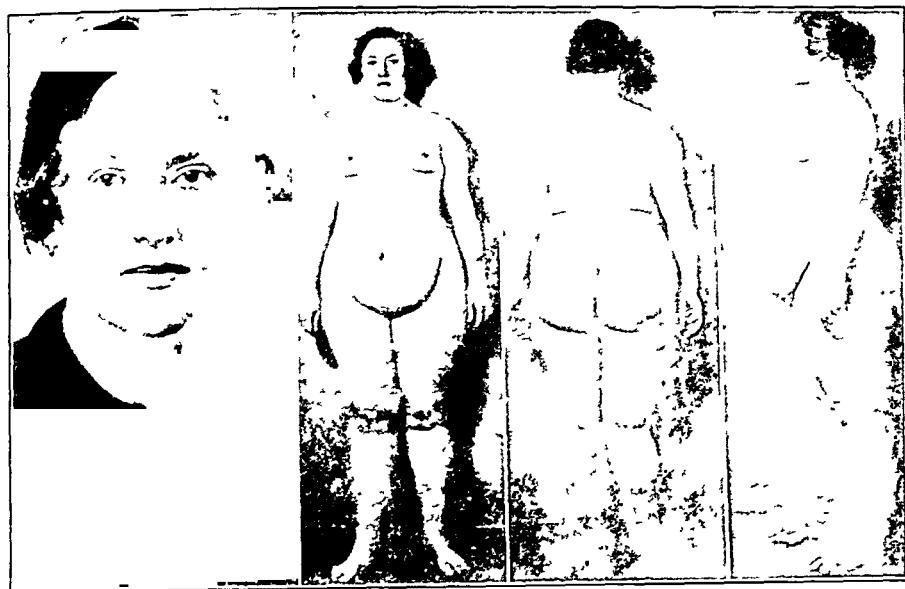


FIG. 3—Lipodystrophy.

Smith has demonstrated in experiments that hypothalamic damage produces obesity without gonadal changes. Pituitary and hypothalamic obesity have identical features and are characterized by the deposition of fat on the trunk, the lower part of the abdomen and the proximal parts of the limbs, whereas the forearms and the calves remain slender. In a few cases the distribution of the fat takes a different form and may result in the so-called lipodystrophy with masses of fat below the girdle and emaciation of the upper parts, particularly the face, where every trace of fat may disappear. We also have seen a case with an accumulation of fat on the neck and abdomen and complete fat atrophy on the extremities.

The pituitary-hypothalamic complex causes obesity not by the failure of a hormone responsible for the catabolism of fat—it is even doubtful whether such a "fat hormone" exists—but by its influence on the fat cells themselves. The combination of obesity or lipomatosis with fat atrophy in definite areas indicates the general neuro-endocrine influence, which renders the fat tissue lipophilic, attracting fat, as well as lipophobic, barring fat, accentuating thus in the females the fat distribution characteristic of the female sex and feminizing the external appearance of males. This is most conspicuous in those instances in which the dis-

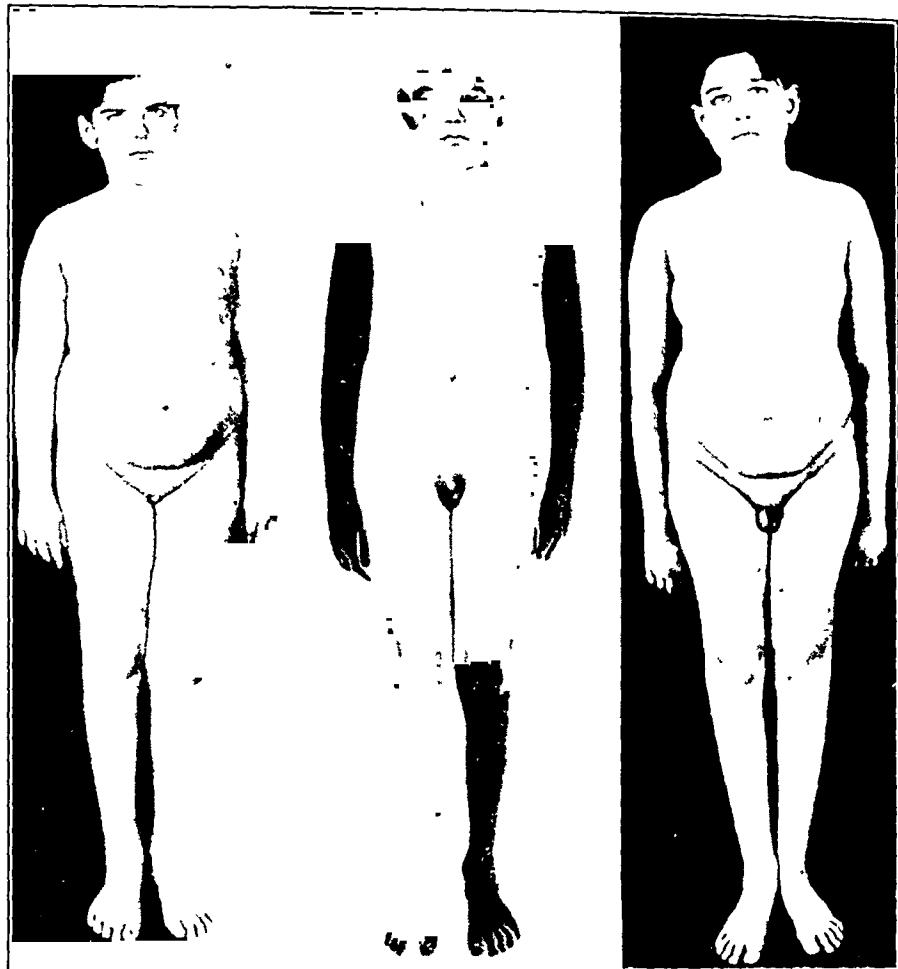


Fig. 4—Three cases of Froehlich's syndrome.

tribution of fat is altered without apparent obesity and fat accumulates above the hipbones, as in the case of a boy with infantile gigantism.

Differentiation between the pituitary and the hypothalamic origin of obesity combined with hyposexualism—if it can be said to be an actual difference at all—depends upon variations in growth. When the pituitary influence predominates, retardation of growth and pituitary dwarfism may result. When the hypothalamic influence is prevalent, growth continues and, owing to the relationship between sex maturation on the one hand and ossification and closure of the epiphyses on the other, leads to the tall eunuchoid type or infantile gigantism.

Children and adolescents with the Froehlich syndrome look very

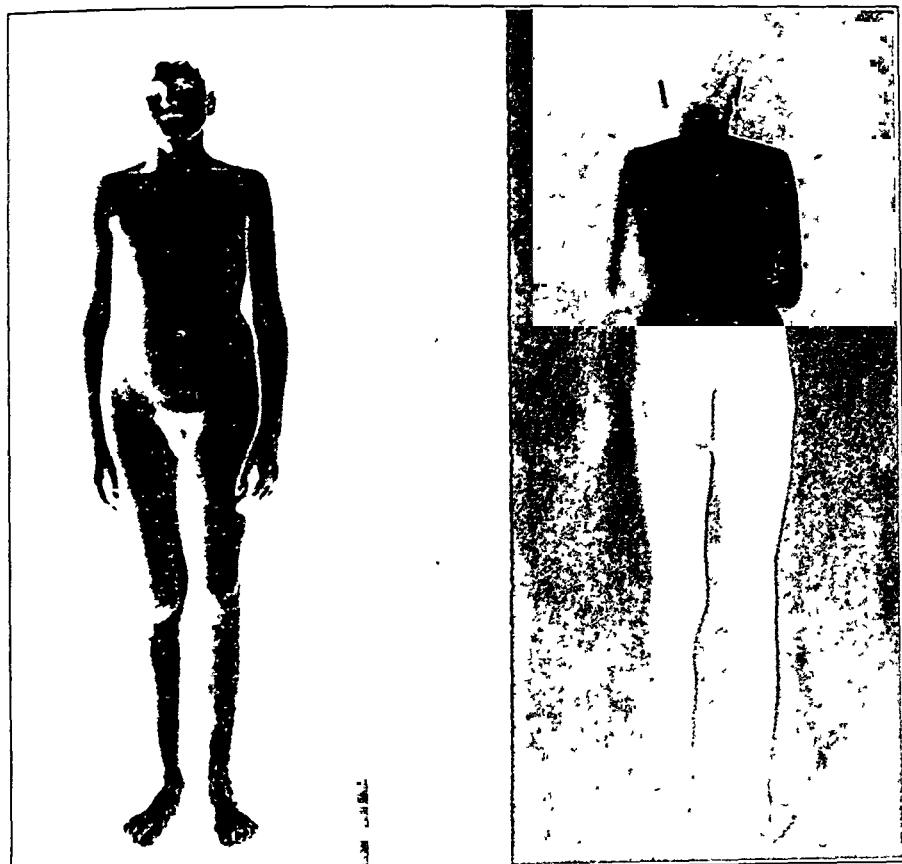


Fig. 5—*Infantile gigantism*

much alike, as if belonging to the same family tree, and also have marked similarities in character, temperament and behavior. They retain the infantile habitus over long and are slow in developing a definite individuality. Girls not infrequently develop an inferiority complex and a rather violent desire to normalize their appearance.

This, however, is rather difficult to accomplish. The basic part of the obesity scarcely responds to such dietary restrictions, as are suitable and applicable during the growing stage, when used over a longer period of time. However, not infrequently reduction of weight takes place spontaneously with the onset of sexual maturation. The additional adiposity resulting from overeating can be removed. Overeating in this type is not so much due to a blamable overindulgence as to episodes of hypoglycemia with its feeling of stomach emptiness, acute hunger.

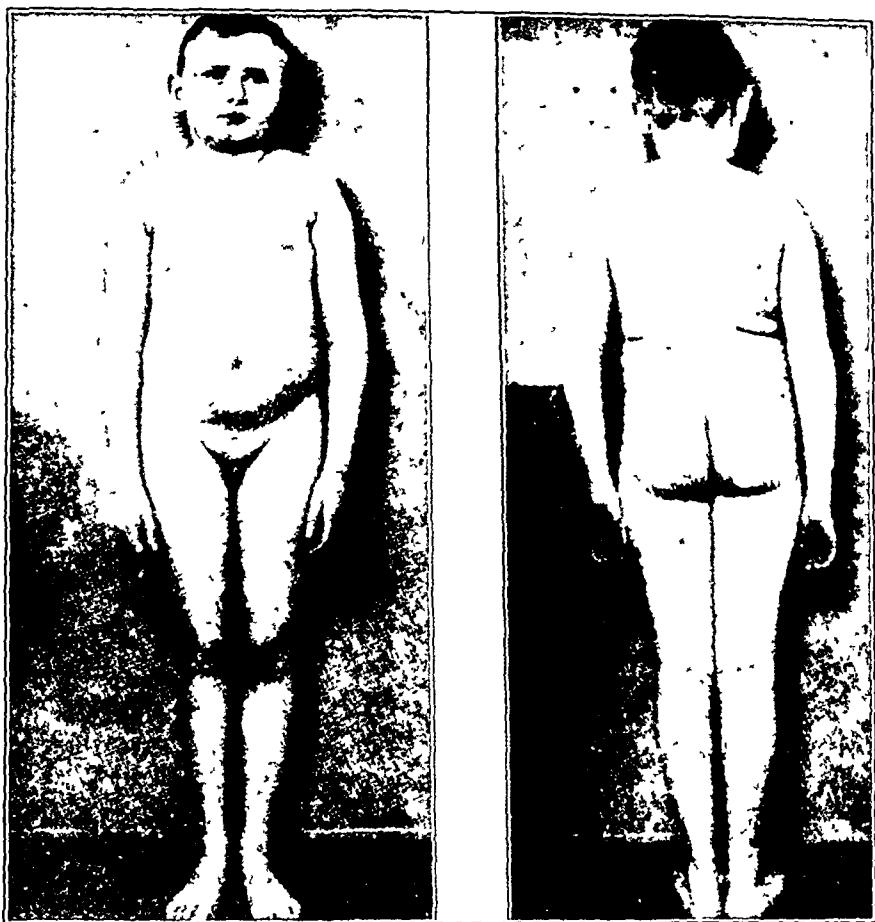


Fig. 6—Pituitary dwarfism.

weakness, craving for food, especially sweets. In such cases the dietary management of the hypoglycemia should be resorted to. During the period of growth, as a rule, a diet almost sufficient in caloric value, rich in proteins and otherwise consisting of fruits, vegetables, particularly in a raw state, with a limited amount of bread and cereals and very poor in fat, is advisable. The administration of thyroid extract is frequently indicated and a dose just below the individual tolerance should be given. Gonadotropic hormone is expedient in order to stimulate the sexual development. This therapy has been successful in a number of cases but is by no means always a panacea. In the fortunate individuals the descent and growth of the testicles can be induced. In the majority of cases sexual maturation sets in spontaneously during the age of adolescence. Thus it occurs that a man with the history and some earmarks of the

Froehlich syndrome may have a son of the same type.

It may be worthwhile mentioning that children with Froehlich syndrome apparently are particularly susceptible to infectious diseases and often are stricken with rheumatic fever. This may be interpreted from the viewpoint that these individuals are more infantile than normal children and thus more susceptible to the infectious diseases of childhood. Or it may point to the relationship of the pituitary-hypothalamic apparatus to the mechanism of defense and immunization.

In conclusion I might emphasize that the relationship between the nervous system and the endocrinal glands, culminating in the hypothalamic-pituitary complex, represents a central point from which the many parts of the medical science are visible; some of them at close range, others still in the far distance, but all of them recognizable as integral parts of the indivisible entity, Medicine.

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PHYSIOLOGY AND PRINCIPAL INTER- RELATIONS OF THE THYROID GLAND*

DAVID MARINE

ANATOMY

THE thyroid gland of vertebrates in its normal or colloid stage morphologically suggests a storage gland, and in its hyperplastic stage a very active secreting gland. It is one of the most labile tissues in the body—capable of undergoing detectable morphological changes within a few hours. Because of this rapid and wide range of anatomical changes we are provided with a very delicate (at present too delicate for clinical use) anatomical measure of functional variations. This series of morphological changes may be designated as the anatomical cycle and consists of (1) hypertrophic or hyperplastic, (2) colloid or resting, and (3) atrophic stages. The actively hypertrophic or hyperplastic stage according to my belief is the initial stage of goiter formation. It indicates stimulation and increased functional activity of the cells but not necessarily an increased production of the thyroid hormone. This stage, so far as it is at present known, is brought about by the thyrotropic factor of the anterior pituitary. The colloid stage represents the return of the hyperplastic stage to its functionally normal or quiescent state, and the atrophic stage represents the permanently exhausted state of the thyroid. There is at present no basis for assuming that the morphological cycles in endemic goiter, in Graves' disease, in compensatory hypertrophy following partial removal or the hypertrophy following injections of anterior pituitary extract differ in any essential manner.

PHYSIOLOGY

Our knowledge of thyroid physiology began with Sir William Gull's recognition in 1874 of thyroid atrophy in the disease that bears his name. This was followed by the production by the Reverdin brothers (1882) and T. Kocher (1883) of a condition resembling Gull's disease following total thyroidectomy for the cure of goiter.

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In 1891 Murray cured a case of Gull's disease by injecting a glycerol emulsion of fresh sheep's thyroid and in 1892 Howitz, McKenzie and Fox independently demonstrated that dried or cooked thyroid was equally efficacious when administered orally. In 1895 Magnus-Levy, using the newly developed calorimeter, discovered that in Gull's disease the heat production was lowered as much as 40 per cent. Later work showed this lowering of metabolism was a typical effect of thyroidectomy in all mammals tested. The fall in metabolism usually begins in mammals between the fifth and seventh days after thyroidectomy, and reaches its lowest level in the rabbit between the twentieth and thirtieth days. In man it is said to reach its lowest level about the sixtieth day.

Magnus-Levy further demonstrated that the oral administration of desiccated thyroid substance raises the metabolic rate in cases of Gull's disease as well as in normal persons. These observations determine the principal function of the thyroid as we know it today. In 1912 Gudernatsch found that feeding thyroid to tadpoles caused metamorphosis in two to five days. This is still the most delicate test for the thyroid hormone. It was suggested that this effect on tadpoles might be due to its metabolism-raising effect, but work in recent years, especially with the dinitrophenols, shows that these substances greatly increase the metabolism of tadpoles and of myxedema patients without causing metamorphosis or therapeutically benefiting cases of Gull's disease. The thyroid hormone, therefore, has a specific action not exhibited by iodides nor by metabolism raising substances (adrenalin, dinitrophenol).

The thyroid is richly supplied with vasomotor nerves but the older view that its secretion was under specific nervous control has been abandoned. Cannon and his co-workers thought they had demonstrated such control by anastomosing the phrenic nerve with the distal end of the cervical sympathetic trunk (Langley operation). This work lacks confirmation. Manley and Marine demonstrated that multiple thyroid autotransplants located in widely different parts of the body anatomically respond similarly and simultaneously with the reactions going on in the intact portion of the thyroid. It was also shown that the growth of thyroid transplants was inversely proportional to the amount of thyroid gland removed. These observations indicated that the stimulus for increased functional activity was humoral and not nervous. Smith's and Allen's work on tadpoles demonstrated that this humoral factor was a

hormone (thyrotropic) from the anterior pituitary gland. Baumann and Hunt (1925) demonstrated that the thyroid gland was necessary for Rubner's specific dynamic action of ingested foods in rabbits. They found that it disappeared in thyroidectomized rabbits in from sixty to sixty-five days and could be restored by the administration of desiccated thyroid or thyroxine. Houssay working with dogs thought that hypophysectomy alone did not modify the specific dynamic action and that thyroidectomy did not entirely abolish it. The mode of action of thyroxine in increasing oxidations in the body is unknown. The stimulation is a very general one since it increases the oxidation of proteins, fats and carbohydrates in their normal proportions as indicated by the respiratory quotient. The opinion has been generally held for many years that the thyroid hormone brought about these increased oxidations by activating the various enzyme systems concerned. However, no specific proof has been produced despite the enormous work. It has been found that the catalase of the blood and liver is increased and the lipase is decreased by thyroid feeding. Thyroidectomy decreases the blood catalase. Rohrer first showed that the oxygen consumption of minced liver, kidney and muscle of thyroid fed rats was increased and Ahlgren demonstrated that minced muscle from thyroidectomized animals consumed less oxygen. Thyroxine added to normal tissues *in vitro* is without effect. Cannon and his co-workers have demonstrated that thyroxine was as effective in raising metabolism of sympathectomized cats as in normals. Thyroxine reduces the ascorbic acid and glutathione contents of the blood, indicating that more of these active agents are consumed when oxidation processes are increased.

We have recently reported an observation supporting the enzyme activation theory of thyroxine action. Marine and Rosen found that the administration of desiccated thyroid to rabbits greatly hastens the hydrolysis of testosterone propionate when this substance is injected in oil subcutaneously. Thyroidectomy was found greatly to reduce the urinary excretion of androgens when testosterone propionate was injected, but did not influence significantly the excretion of androgens when testosterone was injected.

There appears to be sufficient evidence to indicate that thyroxine is only the active chemical group of the true thyroid hormone. This was first indicated by the work of Reid Hunt (1923) who showed that thyroxine is less active than iodine equivalent amounts of desiccated

thyroid. Oswald has shown that thyroglobulin injected into the circulation causes an almost immediate increase in the heart rate while thyroxine increases the pulse rate only after a long latent period. More recently Cruz-Coke and others have shown that when thyroxine is incubated for forty-eight hours in homologous serum, then injected into rats, the latent period is reduced twenty-four to forty-eight hours. The work of Salter and Lerner also confirms the view that the physiological activity of desiccated thyroid is proportional to the total iodine rather than the thyroxine iodine.

BIOCHEMISTRY

Coindet's demonstration (1820) that iodine was beneficial in the treatment of goiter made it possible quickly to establish that iodine was the active agent in burnt sponge, sea salt, and seaweed, which had been used beneficially for centuries in the treatment of goiter.

Attempts to demonstrate iodine in the thyroid failed until 1895 when Baumann reported that it was a normal constituent of the gland in mammals. Baumann showed that it was present in variable amounts as a stable organic compound and isolated a brownish powder (iodothyryin) by acid hydrolysis containing up to 10 per cent of iodine. Hutchinson showed that the iodine was contained in the colloid, and Oswald (1899) showed that the colloid was a globulin and introduced the terms thyroglobulin and iodothyroglobulin, since he also recognized that this globulin could be rich or poor in iodine. The globulin content is approximately the same whether the gland is in the colloid state or in the hyperplastic state. The maximum amount of iodine in the thyroid is about 1 mg. per gm. of fresh tissue and this occurs only in normal and colloid glands. The minimum amount is an inestimable trace and this occurs in the most marked degrees of hyperplasia. Between these extremes there are all gradations of iodine content. The normal human thyroid weighs approximately 20 to 25 gm. and may contain a maximum of 1 mg. of iodine per gm. but the average iodine content is about one half this amount (10 to 15 mg.). Iodine appears in the calf's thyroid as early as the third month of fetal life (Fenger). The surviving thyroid, both *in vitro* and *in vivo*, has a unique selective ability to take out and fix iodine reaching it through the blood or other circulating fluid. No other tissue has this capacity and so far as is known the thyroid is the only organ capable of elaborating the iodine containing hormone. Human blood normally

contains between 3 and 6 gamma per cent of iodine and possibly one-third of this is thyroxine iodine (Elmer). The older figures giving 10 to 15 gamma per cent are obviously too high (Baumann).

All efforts to utilize acid hydrolysis for the isolation of the active principle failed. Oswald tried barium hydroxide because Drechsel (1896) had successfully used this method in isolating diiodotyrosine from coral. Oswald failed to obtain the active fraction because, as Harington pointed out, he discarded the acid insoluble fraction with the barium sulphate. Hutchinson, Oswald and others tried peptic and tryptic digestions but failed. Kendall (1913) again undertook to use the method of alkaline hydrolysis and showed that the iodine became increasingly dialyzable through celloidin membranes when thyroid was carefully heated with dilute sodium hydroxide. In 1914 Kendall hydrolyzed thyroid with a 1 per cent sodium hydroxide in 90 per cent alcohol and was able to separate the organic iodine into two fractions: a) acid, insoluble and b) acid, soluble. Kendall showed that the acid insoluble fraction increased the metabolic rate like desiccated thyroid, while the acid soluble fraction did not. In 1916 Kendall announced the isolation of a crystalline compound (thyroxine) from the acid insoluble fraction containing approximately 65 per cent of iodine and which physiologically produced the same effects as desiccated thyroid.

The yields were very poor and his attempts to determine its empirical and structural formulas were unsuccessful. Nurnberg (1907), using Baumann's iodothyryin, attempted to ascertain the iodine holding organic group of thyroglobulin. He was unsuccessful, but certain reactions led him to suggest that the iodine was bound with tyrosine—probably as diiodotyrosine. In 1926 Harington greatly improved the method of extracting thyroxine from the thyroid by returning to the barium hydroxide method of Drechsel. He was able to accumulate sufficient quantities to determine its empirical formula as $C_{15}H_{11}O_4NI_4$, and that structurally it was composed of two molecules of diiodotyrosine, with the loss of one alpha amino-propionic acid side chain and the two benzene rings joined by an ether linkage. The organic nucleus of thyroxine Harington named thronine. In 1927 Harington and Barger, and independently Dakin, synthesized thyroxine and showed that it had the same physiological effects as natural thyroxine. Harington further showed that the acid soluble iodine (part b of Kendall) was diiodotyrosine and identical with that found in coral and sponge. Foster (1929)

confirmed the presence of diiodotyrosine in the thyroid gland and was able to recover as much as 30 per cent of the total iodine as this compound. Harington found that approximately 60 per cent of the iodine of the thyroid is present as diiodotyrosine and 40 per cent as thyroxine. The proportion of these two compounds in the thyroid in relation to variations in the iodine store has not been carefully studied, but if it were found that they rose and fell together, it would be further evidence in favor of the view that the true thyroid hormone is a globulin containing both thyroxine and diiodotyrosine. It is known that the activity of desiccated thyroid is proportional to its iodine content rather than to its thyroxine content (Reid Hunt, Oswald, Salter and Lerner, Cruz-Coke).

In 1936 Ludwig and von Mutzenbecker obtained a substance chemically and physiologically identical with thyroxine by hydrolyzing iodinized casein with weak alkali and heat. This has been confirmed in this country by Foster and in England by Harington. Heretofore only diiodotyrosine had been obtained by hydrolyzing nonspecific iodinized proteins. The reactions which occur in the production of thyroxine from iodinized casein are not known. Ludwig and von Mutzenbecker suggested that iodine could oxidatively couple two molecules of diiodotyrosine with the loss of one side chain. Harington, however, thinks this is unlikely and suggests that possibly thyronine may exist in proteins rich in tyrosine-like casein. Thyroglobulin, however, according to analyses by Epstein, White, Cavett and others, is not an unusual protein as regards its tyrosine content.

Another constituent of the thyroid gland is bromine. This has long been known (1898) but little attention has been paid to its possible role in thyroid physiology until recently. The bromine content of the thyroid averages considerably higher than that of other tissues. Thus Neufeld found around 2 mg. per cent of bromine in normal human thyroids and 1 mg. per cent in the blood. The relation of the bromine content to thyroid structure, if any, has not been determined, and whether any ratio exists between iodine and bromine in the thyroid is likewise unknown. Bromine alone will not invlove thyroid hyperplasia but according to Gaddum tetrabromthyronine has a slight thyroxine-like action. Baumann and myself have also confirmed the fact that the bromine content of the rabbit's thyroid is higher than the blood bromine. Moruzzi (1938) found that feeding sodium bromide in doses of .17 to .25 gm. daily to

dogs caused a progressive loss of iodine from the thyroid gland for the duration of the experiments—560 days. The bromine content rose abruptly during the first sixty days, then declined almost as rapidly. Rabbits' thyroids reacted similarly. There is some clinical evidence that bromine administered with iodine may be more beneficial in the treatment of goiter than iodine alone. No evidence exists at present to indicate that bromine, although constantly present, is of biological importance, but there are ample grounds for the further investigation of this question.

INTERRELATIONS

As the nature and importance of the interrelations of the endocrine glands becomes understood the conception of a purely thyroid disease correspondingly declines, and in my opinion the exact role of the thyroid in disease processes cannot be determined until these intricate interrelations are worked out. Considerable progress has been made in this field during the past twenty years and the following summary of some of these interrelations may be of interest because of their possible importance in clinical medicine.

THYROID-PITUITARY

It has been known for more than a century that persons and animals with large goiters have enlarged pituitary glands. Nièpce (1851) observed pituitaries in goitrous cretins weighing 2.4 gm. (normal, 0.5-0.7 gm.). Rogowitsch (1889) was the first to produce hypertrophy of the anterior pituitary in rabbits by thyroidectomy. This observation has generally been confirmed and the generalization may be made that in all states of severe thyroid insufficiency (cretinism and Gull's disease, endemic goiter) the anterior pituitary tends to undergo hypertrophy. In Graves' disease, on the other hand, the pituitary is usually normal or low normal in size. Histologically all the elements of the anterior pituitary appear hypertrophic and in the rabbit the most striking single feature is the degranulation of the eosinophilic cells. These granules may be promptly restored by the administration of thyroxine or desiccated thyroid. The physiological significance of this thyroid-pituitary interrelationship became more evident when Allen and Smith in 1916 and 1917 showed that removal of the hypophysis in tadpoles, among other effects, caused an involution of the thyroid with reduction in its size. Smith later adapted the pharyngeal route (previously used in dogs by Aschner and others)

to the rat and obtained similar results. He also demonstrated that implants or injections of extracts of anterior pituitary restored such involuted thyroids to normal or even caused hypertrophy, and established the existence of a specific hormonal factor now known as the thyrotropic hormone. So far this hormonal factor has not been entirely separated from the other hormones of the anterior pituitary and it is, therefore, not possible to say whether other pituitary factors will or will not stimulate the thyroid. Hisaw and others obtained a purified luteinizing fraction that caused thyroid hypertrophy. A thyroid stimulating substance has been found in the blood of thyroidectomized animals and in cases of Gull's disease but not in cases of Graves' disease. Eitel, Krebs and Loeser have shown that anterior pituitary extracts will cause hypertrophy of surviving thyroid cells in vitro. Marked hyperplasia of the thyroid beginning within a few hours occurs in susceptible animals. This hyperplasia is associated with a rapid loss of iodine from the thyroid, a corresponding increase in the blood iodine, an increase in the metabolic rate and in calcium and creatine excretion. The administration of iodine has an inhibitory effect on thyroid hyperplasia and also greatly reduces the high metabolic rate caused by pituitary extracts. (Iodine does not lower the increased metabolic rate produced by thyroxine.) Exophthalmos may develop as a late phenomenon in susceptible species (fish, birds, guinea pigs). It was quickly pointed out that this transient symptom complex was strikingly similar to that seen in Graves' disease. Unfortunately it has not helped in the elucidation of this symptom complex but it has further confirmed the fact that Graves' disease is a very complex polyglandular disturbance.

Growth is so constantly depressed by thyroidectomy alone and by hypophysectomy alone that the impression was formed that a thyroid component was necessary for the effectiveness of the growth hormone. In 1925 Evans reported that he had obtained growth in thyroidless rats and recently (1939) further reports that good growth may be obtained in thyroidectomized rats. However, he finds slightly better growth in animals with intact thyroids.

THYROID-GONAD

This interrelationship was known to the ancients as evidenced by enlargement of the thyroid gland during puberty, menstruation, pregnancy and the menopause. Thyroxine is stated not to reduce the comb-

growth promoting effects of androgens but it certainly lessens the exophthalmos-promoting effects of testosterone propionate. There is abundant evidence that thyroxine reduces the action of estrogens. Abelin has shown that thyroxine will suppress estrus in the rat and Smelzer and others have shown that it reduces the size of the testis in doses too small to affect body weight and growth. It requires more estrone to induce estrus in rats that are given thyroxine. Estrone has been shown to depress the thyroid, as evidenced by involution, and increases the iodine store, while androgens do not have this effect. Indeed, there is evidence that they stimulate the thyroid.

Fluhman found that thyroxine decreased the activity of the gonadotropic factor. Removal of the ovaries causes a temporary enlargement of the thyroid (first noted in dogs) and Loeser has studied this reaction extensively in the guinea pig. He thinks it is mediated by way of the pituitary gland. It is well known that gonadectomy in animals usually leads to a depression and involution of the thyroid after the initial stimulation. This is also indicated in the slight lowering of the metabolic rate in castrates. Schockaert first showed that pituitary extracts caused a much more marked gonadotropic effect in thyroidectomized animals and we have repeatedly pointed out that in puberal rabbits goiter or subtotal thyroidectomy usually hastens sexual differentiation and greatly increases sexual activity. It is usual to see in such rabbits sexual activity at three months, while our two strains usually do not become sexually active until three and one-half to four and one-half months. Hill has made the important observation that ovaries transplanted to the ears of castrated male mice will maintain the prostate gland but if thyroxine is administered the prostate regresses to the castrate type. Also Tyndall and Lewin found that the increased sensitivity of hypophysectomized rats to menopause urine extract can be decreased by thyroxine administration. Thus they demonstrated a direct thyroid-gonad effect in addition to those (estrone) believed to be mediated through the pituitary. All of this experimental work appears to have a direct bearing on the age-old observations mentioned above. Thus the menstrual thyroid enlargement occurs at a time when the estrogens are at their lowest level and the androgens are relatively at their highest level. The thyroid enlargements occurring at the menopause, natural and surgical, and occasionally associated with the development of Graves' disease may also be connected with a decrease in estrogens. Myxedema also develops at the menopause and in contrast

with Graves' disease may be associated with a decrease in both estrogens and androgens.

THYROID-ADRENAL CORTEX

There is a great deal of evidence for a thyroid-adrenal cortex interrelation. R. G. Hoskins (1910) reported that feeding large doses of thyroid to young guinea pigs caused hypertrophy of the adrenal cortex. Similar reports for cats and rats were made in 1916 (Hering and E. R. Hoskins). Cameron and Carmichel (1920), using rats, and many other observers have confirmed the above observations. In 1920 my colleagues and myself reported that sufficient but sublethal injury of the adrenals in rabbits by freezing or removal, with intact thyroids resulted in increase in O_2 consumption and CO_2 output in about 80 per cent of the animals used. This increase in metabolism began between the third and sixth days and lasted from a few days to several months. On the other hand, if the thyroid gland had been removed and the metabolic rate allowed to fall to the myxedema level prior to adrenal injury, this increase in heat production did not occur. Davis and Hastings have made similar observations on mice. The observation of Butcher that adrenalectomy hastens hair growth over shaved areas of white rats and that it takes larger amounts of thyroxine to hasten hair growth in normal rats than in adrenalectomized rats further suggests an antagonistic effect of the adrenal cortex on the action of thyroxine.

Adrenalectomized animals are very sensitive to thyroxine and several observers (Cameron, Koelsche) found that cortin offers some protection. Marine, Baumann and Cipra (1925) showed that feeding large quantities of a glycerol emulsion of fresh ox adrenal cortex significantly lowered the heat production in eight of eleven rabbits. Oehme (1936) reported that a cortical extract (cortidyn) partially protected guinea pigs against the action of thyroxine and inhibited the increased metabolism caused by 40 to 100 units of thyrotropic hormone, but did not inhibit thyroid hypertrophy.

Reiss and Peter have obtained a lowering of the blood iodine and involution of the thyroid with the cortical hormone. In cases of Graves' disease we have seen definite beneficial effects from cortical extracts. Richardson also reports a slight decrease in metabolic rate following cortical hormone administration. Other evidence supports the existence of a thyroid-cortical hormone interrelation. Thus many observers have

noticed failure to obtain striking hypertrophy of the adrenal cortex with anterior pituitary extracts in thyroidectomized rats and guinea pigs. Some observers have denied that the thyroid is necessary but a recent series of experiments in guinea pigs by Rosen and myself strikingly illustrate the importance of the thyroid for this hypertrophy. Loeser also showed that hypertrophy of the adrenal cortex occurred in thyroidectomized animals if given thyroxine with the anterior pituitary extract. This can be correlated with the occurrence of cortical hypertrophy following thyroxine alone if the pituitary gland is intact. Reiss and Peter have recently reported that cortical hormone lowered the blood iodine and involuted the thyroid.

Another type of evidence is the presence of a Graves' disease-like hyperplasia of the thyroid in those cases of Addison's disease associated with atrophy of the adrenal cortex. Chiari has reported two cases and I have observed one such case. Bastenie and Maes have obtained slight hypertrophy of the thyroid during the first few days following removal of the second adrenal somewhat comparable to the slight thyroid hypertrophy which follows ovariectomy and which is believed to be mediated by way of the pituitary.

The observation of Zwemer that thyroidectomy prolonged the lives of adrenalectomized cats and that feeding thyroid shortened their lives appears logical, although Weyman, using rats, could not confirm it.

To sum up then, there is much evidence from many angles that the adrenal cortex has an antithyroid action and it seems to be beyond question that these two organs have antagonistic effects. From the practical point of view it also appears certain that the total picture of Graves' disease with its creatinuria, loss of hair, muscular weakness, achlorhydria, pigmentation and persistent thymus involves, among other things, an adrenal insufficiency.

THYROID-CHROMAFFIN SYSTEM

Some interrelation is indicated because thyroxine and epinephrine are derivatives of tyrosine, and because both of these hormones are powerful activators of metabolism through different mechanisms. Goldberg and others have shown in thyroidectomized lambs, and we have confirmed it in thyroidectomized rabbits, that the adrenal medulla is definitely hypertrophic. Barker and others showed that in rats thyroidectomy decreased and thyroid feeding increased the response to adrenalin. Seeley and

Cutler studying patients with myxedema (spontaneous and postthyroidectomy) found them to be less sensitive to adrenalin than normal individuals. Hering has shown that thyroid feeding increases the epinephrine store in the adrenal. Asher and Flack first showed that the blood pressure response in rabbits to a given dose of adrenalin was greater after stimulation of the thyroid nerve with intact thyroid than before. This has been confirmed particularly by Cannon and his co-workers. Oswald has shown that a similar increase in the blood pressure response to adrenalin may be obtained by the intravenous injection of iodothyroglobulin and the effect produced is proportional to the iodine content of the thyroglobulin injected. The Goetsch epinephrine test for exophthalmic goiter may be a clinical application of increased sensitivity to adrenalin. All these observations would support the original view of Asher and Flack that the thyroid hormone increases the irritability of the sympathetic nervous system and sensitizes the tissues innervated by it so that they are more susceptible to stimulation by epinephrine.

THYROID-THYMUS

In 1912 Gudernatsch observed that thymus gland fed to tadpoles increased the rate of growth, definitely retarded metamorphosis and offered some protection against the effects of thyroid feeding. These observations have been abundantly confirmed. Hoskins found that thyroid fed to guinea pigs caused the thymus to enlarge. This observation has been confirmed and extended to other species. Thus Kahn and Spiegler found that thyroid feeding caused a rapid proliferation of the thymus cells in frogs. Albertini claims to have produced a condition resembling status thymolymphaticus by thyroid feeding. Thyroidectomy has regularly been found to hasten involution of the thymus. Removal of the pituitary gland in dogs, according to Houssay, causes involution of the thymus. Roelandt and others found that immature rabbits (as is true of immature animals generally) are less sensitive to thyroxine than adults but that thymectomy increases their sensitivity. They also found that a thymus extract made adult rabbits less sensitive to thyroxine. Asher and his co-workers have prepared a peptide extract of calf's thymus which they call thymocresin. This extract promoted growth and was rich in the sulphhydryl groups. Nowinski obtained some protection against thyroxine action by the use of thymocresin.

In diseases in which thyroid activity is believed to be increased, as

in Graves' disease and acromegaly, thymus hypertrophy frequently occurs. All these effects indicate some kind of antagonism between the thyroid and thymus glands. In prepuberal animals the condition of the adrenal cortex appears to be the most powerful factor in determining the status of the thymus. Hence in conditions with excessive thyroid activity or decreased adrenal cortex activity thymectomy would not appear to be a rational therapeutic measure, and I believe thymectomy is no longer done in the treatment of Graves' disease.

THYROID-PARATHYROID

The view that the parathyroid glands could function vicariously for the thyroid was disproved by Gley's demonstration in the rabbit that the so-called acute effects of thyroidectomy seen in dogs and cats were due to the accompanying parathyroidectomy. The strikingly different symptoms following thyroidectomy and parathyroidectomy appear to have established independent functions for these glands, but during the past decade evidence has accumulated indicating that they are at least complementary in certain of their functions. The work on experimental rickets and especially the work of Aub and his co-workers on exophthalmic goiter, thyroid feeding and myxedema shows that the thyroid is also concerned in the metabolism of calcium and phosphorus. The idea that excessive calcium ingestion was a causal factor in endemic goiter was suggested a century ago (McClellan, 1837). Aub has shown that in Graves' disease the calcium excretion is greatly increased while in myxedema it is decreased. Both thyroid feeding and the administration of the thyrotropic hormone greatly increase calcium excretion. Excessive thyroid feeding causes parathyroid hypertrophy. Thyroidectomy in rabbits on diets with normal calcium phosphorus ratios usually causes involution of the parathyroids. The increased thyroid activity in animals (dogs, rats, rabbits) on the rachitogenic diets is associated with parathyroid hypertrophy. It may, therefore, be significant that no parathyroid changes have been demonstrated in Graves' disease.

THYROID-CREATINE

Graves' disease is usually associated with creatinuria and Denis first demonstrated that the muscle creatine was markedly reduced. Feeding thyroid to animals reduces the muscle creatine about 20 per cent and the heart muscle creatine about 40 per cent. In myxedema there is ordinarily

no creatinuria but if such cases are fed desiccated thyroid, Richardson and Shorr have shown that creatinuria may appear before any detectable rise in the metabolic rate occurs, and that the creatinuria may stop when the metabolic rate is restored to normal, although the patient continues to take desiccated thyroid. Carson and Palmer had previously noted that the creatinuria produced by thyroid feeding in normal subjects often stopped even though the metabolic rate was rising. The thyrotropic hormone also causes creatinuria in animals with intact thyroids. Creatine tolerance is lowered to about 40 per cent in cases of Graves' disease and iodine therapy raises this tolerance to 65 to 70 per cent. Dinitrophenol also causes a sharp increase in creatinuria (Pugsley). Adrenalectomy causes a marked drop in muscle creatine associated with creatinuria, and Maranon has shown that cortical hormone administration decreases the creatinuria of Addison's disease. This suggests that possibly the adrenal cortex hypertrophy which follows thyroid feeding is a protective mechanism which aids in the resynthesis of phosphogen.

THYROID-VITAMINS

A considerable but conflicting literature has accumulated on the relation of the various vitamins to thyroid function.

Vitamin A. Many observers have noted some protective action of vitamin A in experimental hyperthyroidization (Abelin and H. Euler). Abelin showed that thyroxine reduced the vitamin A content of the liver and Wegelin's recent work indicates that vitamin A offers some protection to the stores of liver glycogen following thyroxine administration. Vitamin A also appears to have a slight inhibiting effect on the thyrotropic hormone but does not change the blood iodine levels (Elmer).

Vitamins B₁ and B₂. Conflicting results are reported. B₁ in large doses appears to protect animals against the weight loss due to thyroxine administration (Sure) and thyroxine hastens the development of beriberi in fowls. B₁ does not inhibit the action of the thyrotropic hormone (Elmer). Dr. Sandberg in our laboratory was unable to invlove hyperplastic thyroids of rabbits with large amounts of the B complex.

Vitamin C. Vitamin C appears to have a more marked effect on the thyroid than either vitamin A or B. Many observers (Mouriquand and Michel, 1920, and Nobel and Wagner, 1923) have shown that thyroxine administration hastens the development of scurvy. It is well known that hypertrophy of the thyroid occurs during the developmental stages of

scurvy, associated with an increase in the metabolic rate and an increase in the blood iodine (Fasold). Thyroid feeding depletes the stores of vitamin C, while thyroidectomy increases them. The excretion of ascorbic acid has been found to be lowered in Graves' disease and to be increased after partial thyroidectomy (Lewis). Ascorbic acid appears to decrease the action of thyrotropic hormone on the thyroid gland (Marine et al, Elmer et al). Plehwe has been able to reduce the creatinuria of Graves' disease with large doses of ascorbic acid, but no appreciable beneficial effects on Graves' disease have been reported from the use of ascorbic acid.

Vitamin D. The quite frequent occurrence of thyroid enlargement in human and experimental rickets led to the suggestion of a thyroid-vitamin D relationship, but the work of Thompson has shown that in the white rat experimental goiter and experimental rickets could be dissociated, that is, she could obtain goiter and rickets or prevent rickets and obtain goiter, or produce rickets without goiter by giving or withholding iodine and viosterol. The long clinical association of endemic goiter and high calcium intakes; the increased calcium excretion following thyroid feeding and the frequent association of goiter and rickets has kept up a lively interest in the relation of the thyroid gland to rickets.

Nitsche thought that the low metabolic rate and the thyroid enlargement of rickets was indicative of a thyroid deficiency. The observation of Kunde and Williams that cod liver oil would not cure rickets in thyroidectomized rats suggests that possibly the thyroid may be important in the utilization of vitamin D. In the rabbit we have not observed that ergosterol influenced the development of goiter.

In summary, one can discern a similarity of the effects for all four of the vitamins mentioned, that is, hyperthyroidization increases the needs for, and tends to deplete the stores of these vitamins. Hence it is logical to expect that hypervitaminosis would offer some protection against thyroxine administration. In the early stages of B₁ and C avitaminosis there is increased metabolism, increased blood iodine and moderate thyroid hypertrophy followed by decrease as the avitaminosis progresses. The evidence, taken as a whole, indicates that vitamins do not specifically affect the thyroid and, as Means has pointed out, there is no evidence that the administration of vitamins appreciably benefits either Graves' disease or Gull's disease.

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"Possession does not imply approval"

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PROCEEDINGS OF ACADEMY MEETINGS

STATED MEETINGS

OCTOBER 5—*The New York Academy of Medicine.* Executive Session—a] Reading of minutes. ¶ Papers of the evening—The treatment of pyogenic infections with special reference to chemotherapy—a] Introductory—general observations on bacteremia, Emanuel Libman, Consulting Physician, The Mount Sinai Hospital; b] Osteomyelitis, D. B. Phemister, Professor of Surgery, University of Chicago; c] Otitis media and its extensions, Edmund P. Fowler, Jr., Assistant Clinical Professor of Otolaryngology, College of Physicians and Surgeons. ¶ Report on election of members.

OCTOBER 19—*The Harvey Society (in affiliation with The New York Academy of Medicine)* The First Harvey Lecture, "Electrophoretic Analysis and the Constitution of Native Fluids," Arne Tiselius, Professor of Biochemistry, Fysikalisk-Kemiska Institutionen, Uppsala Universitet, Sweden.

NOVEMBER 2—*The New York Academy of Medicine.* Executive Session—a] Reading of the Minutes; b] Report of Nominating Committee. ¶ Papers of the Evening (Graduate Fortnight) a] Physiology of the ovaries, Philip E. Smith, Professor of Anatomy, Columbia University; b] Physiology of testes and therapeutic application of male sex hormones, Carl R. Moore, Professor of Zoology, University of Chicago. ¶ Report on Election of Members.

NOVEMBER 16—*The Harvey Society (in affiliation with The New York Academy of Medicine).* The Second Harvey Lecture, The Biological Significance of Nicotinic Acid, C. A. Elvehjem, Professor of Biochemistry, College of Agriculture, University of Wisconsin.

SECTION MEETINGS

OCTOBER 3—*Section of Dermatology and Syphilology.* Presentation of cases—a] Clinics; b] Hospitals; c] Members. ¶ General Discussion. ¶ Executive session.

OCTOBER 6—*Section of Surgery.* Reading of the minutes. ¶ Presentation of cases—Rectus transplantation for midline incisional hernia, John E. Sutton, Jr.; Discussion, Seward Erdman. ¶ Papers of the evening—a] End results of silk repair in 1000 hernia operations, Roland L. Maier, William Ross McCarty (by invitation); Discussion, Fenwick Beckman; b] A clinical study of the use of alloy steel wire in hernia repair, Louis René Kaufman; Discussion, Paul Kurt Sauer; c] The injection treatment of hernia, clinical-pathological evidence for its rationale, Carl O. Rice, University of Minnesota (by invitation); Discussion, David H. M. Gillespie. ¶ General discussion. ¶ Executive session.

OCTOBER 10—*Section of Neurology and Psychiatry.* Reading of the minutes. ¶ Papers of the evening—a] The diagnosis of

arachnoiditis and varicosities of the spinal cord and cauda equina by direct visualization of the nerve roots with a myeloscope, J. Lawrence Pool (by invitation); Discussion, Byron Stookey, Charles A. McKendree, Ira Cohen, Richard Brickner, E. L. Stern; b] Studies on headache—pain sensitive structures in the cranium and their significance, B. S. Ray, H. G. Wolf; Discussion, Joseph C. Hinsey, Ph.D. (by invitation), Byron Stookey, H. A. Riley, L. Hausman, Tracy Putnam; c] Injuries to the deep and superficial peroneal nerves complicating ankle sprain, George H. Hyslop; Discussion, Lewis C. Wagner, Samuel Brock, Byron Stookey.

OCTOBER 12—*Section of Pediatrics.* Reading of the minutes. ¶ Papers of the evening—a] The clinical picture of tuberculosis, Edith Lincoln; b] The tuberculin test in relation to case-finding—especially from the general practitioner's viewpoint, Herman Schwarz; c] The roentgenographic diagnosis of tuberculosis in infants and young children, John Caffey. ¶ Discussion, Charles Hendee Smith, Bela Schick, Herbert R. Edwards, William H. Meyer, Camille Kereszturi. ¶ Executive session.

OCTOBER 16—*Section of Ophthalmology.* Instruction hour 7:00 to 8:00. Further principles in plastic surgery of the eye, Wendell L. Hughes. Demonstration 8:00 to 8:30. Sections and photomicrographs showing comparative histology of the eye, Mr. Roy M. Allen (by invitation). ¶ Reading of the minutes. ¶ Presentation of cases—a] Sarcoid of the lacrymal gland, David Wexler; b] Streptothrix infection of the lower canthalculus, with calculus formation, David O. Shepard (by invitation). ¶ Paper of the evening, Chorioretinal arteriolar necrosis in a case of malignant hypertension, Martin Cohen. ¶ General discussion. ¶ Executive session.

OCTOBER 17—*Section of Medicine.* Reading of the minutes. ¶ Papers of the evening—a] Ultrafiltrable magnesium studies in

hyperthyroidism, Louis J. Soffer; Discussion, George Bachr; b] The use of deproteinated pancreatic extract (depropanex) in the treatment of intermittent claudication, Irving Sherwood Wright. ¶ General discussion. ¶ Executive session.

OCTOBER 18—*Section of Genito-Urinary Surgery.* Reading of the minutes. ¶ Papers of the evening—a] Hypertension—the problem, the study, the future, Stanford W. Mulholland, Temple University, Philadelphia (by invitation); b] The surgical treatment of hypertension in unilateral kidney disease, Reed Nesbit, University of Michigan, Ann Arbor (by invitation). ¶ General discussion. ¶ Executive session.

OCTOBER 18—*Section of Otolaryngology.* Reading of the minutes. ¶ Papers of the evening—a] Surgery of the auricle including total reconstruction and flop ears, Gerald H. Cox (by invitation); b] Nasal plastic surgery, Clarence R. Straatsma (by invitation); c] Oral plastic surgery, Henry S. Dunning; Discussion, Jerome P. Webster, William H. Holden, Douglas B. Parker (by invitation). ¶ General discussion.

OCTOBER 20—*Section of Orthopedic Surgery.* Reading of the minutes. ¶ Presentation of cases—a] Toes and tarsal amputations, Halford Hallock; b] Mid-tarsal amputation, Frederick Thompson (by invitation); c] Simms amputation, John C. McCauley; d] Lower tibial amputation, Beverly C. Smith; e] Upper tibial amputation with fibular head en situ, Joseph B. L'Episcopo; f] Upper tibial amputation with fibula removed, Mather Cleveland; g] Gritti-Stokes amputation, Edward Winant (by invitation); h] Mid-thigh amputation, Ernest Meyers (by invitation); i] Hip joint disarticulation, Leo Mayer. ¶ Paper of the evening, Cineplastic amputations, Henry Kessler, Newark (by invitation); Discussion, Henry H. M. Lyle. ¶ General discussion. ¶ Executive session.

Section of Obstetrics and Gynecology. Because of conflict in dates with the Graduate Fortnight, the meeting of the Section was not held.

Dermatology and Syphilology. The regular meeting of the Section was not held because of the date falling on Election Day and also due to the meeting of the American Academy of Dermatology and Syphilology in Philadelphia on November 6, 7, and 8.

Surgery. The Section of Surgery consented to forego its November meeting because of conflict in dates with the Graduate Fortnight.

NOVEMBER 8—Historical and Cultural Medicine. Reading of the minutes. ¶ Papers of the evening—Symposium on Syphilis—a] Introduction, John L. Rice; b] Contributors to the knowledge of syphilis since 1492 (illustrated with lantern slides), Herman Goodman; c] Old epidemics of syphilis, Theodore Rosenthal. ¶ Discussion—C. C. Pierce (by invitation), Leona Baumgartner (by invitation), Harry H. Sobotka, Richard C. Holcombe, Upper Darby, Pa. (by invitation). ¶ General discussion.

NOVEMBER 9—Pediatrics. Reading of the minutes. ¶ Papers of the evening—a] Long Island Medical College—An eight-year-old boy with generalized decalcification possibly hyperparathyroidism with metabolic studies, H. C. Eisenberg (by invitation), Louis E. Weymuller (by invitation); b] Cornell University Medical College—Pyrexia associated with abdominal pain of six months' duration in a thirteen-year-old boy, James M. Hanks (by invitation), Samuel Z. Levine; c] New York Post-Graduate Medical School—Report of a case with clinical manifestations of a blood dyscrasia, Irving Posner (by invitation); d] Mount Sinai Hospital—Fulminating meningococcemia with bilateral adrenal hemorrhage (Waterhouse Friderichsen syndrome), J. A. Danciger (by invitation), Bela Schick; e] Lincoln Hospital—Johnson's disease (erythema multiforme bullosum), Harry Ageloff (by

invitation). ¶ General discussion. ¶ Executive session.

NOVEMBER 14—Combined meeting of Neurology and Psychiatry with the New York Neurological Society. Papers of the evening—a] Spastic pseudosclerosis: Cases with familial and non-familial incidence, Charles Davison, A. M. Rabiner; Discussion by M. Keschner, I. S. Wechsler; b] On epilepsy, Otto Marburg (by invitation); c] Pathogenesis of syphilitic blindness and the restoration of vision by surgery, Louis Hausman; Discussion by Bernard Sachs, Foster Kennedy. ¶ Executive session.

NOVEMBER 15—Otolaryngology. Reading of the minutes. ¶ Papers of the evening—a] Some late results of brain abscess; Presentation of patients, Ira Cohen, Abraham Kaplan (by invitation); b] Management of brain abscess of otorhinogenic origin, Joseph E. J. King. ¶ Discussion by Foster Kennedy, Isidore Friesner, Robert E. Buckley, Lewis D. Stevenson, Edgar A. Kahn, Ann Arbor (by invitation). ¶ General discussion. ¶ Executive session.

Genito-Urinary Surgery. On account of the November meeting of the New York Society of the American Urological Association, the Section decided to forego their meeting this month.

NOVEMBER 17—Orthopedic Surgery. Reading of the minutes. ¶ Papers of the afternoon—a] Charcot neuroarthropathy, Maurice M. Pomeranz, Abraham S. Rothberg (by invitation); b] End-result study of posterior bone-block operations at the ankle, Lewis Clark Wagner; c] Osteochondritis dissecan of the knee, Walker Swift; d] Muscle metabolism as an etiological factor in scoliosis, John Cobb (by invitation); e] Treatment of osteogenic sarcoma, Albert Ferguson (by invitation); f] Sclerosing osteomyelitis of the neck of the femur, Nicholas Ranchoff; g] Aspects of the surgical treatment of tuberculosis of the spine in children, William H. vonLackum (by invitation); h] An operation for flat feet, Isidore Zaiden; i] Further

experiences with celloidin tube implantations for tendon injuries, Leo Mayer; j] Congenital club feet, J. Neill Garber (by invitation); k] Rare congenital deformity of the right upper extremity, consisting of double arms, three hands and sixteen fingers, Harry C. Stein (by invitation). ¶ General discussion. ¶ Executive session.

NOVEMBER 20—*Ophthalmology*. Instruction hour 7:30 to 8:30—Slit-lamp microscopy of the vitreous, Milton Berliner. ¶ Reading of the minutes. ¶ Presentation of cases—a] Groenouw's corneal dystrophy, Walter Hipp; b] Lymphangioma of the orbit, Herman Goldberg (by invitation); c] Congenital retinal folds, Frederick Theodore (by invitation). ¶ Papers of the evening—a] The relationship of drusen of the optic nerve to tuberous sclerosis, Algernon Reese; Discussion by Ferdinand Koch (by invitation); b] Treatment of syphilitic optic atrophy due to chiasmal arachnoiditis, Louis Hausman; Discussion by Bernard Sachs, Thomas Johnson. ¶ Executive session.

NOVEMBER 21—*Medicine*. Reading of the minutes. ¶ Moving pictures—a] Pneumonia—Diagnosis and treatment, Norman Plummer, H. K. Ensworth (by invitation). ¶ Papers of the evening—a] Heparin and other inhibitors of blood coagulation, Erwin Chargaff (by invitation); b] Clinical experiences with heparin, Kenneth B. Olson (by invitation); Discussion by Allen O. Whipple, Paul Reznikoff. ¶ General discussion.

NOVEMBER 28—*Obstetrics and Gynecology*. Reading of the minutes. ¶ Presentation of cases—a] Masculinizing tumors of the ovary—Lantern slides, Salo M. Boltuch (by invitation); Discussion by Leon Motyloff (by invitation), Howard E. Lindeman; b] Torsion of the non-pregnant, non-myomatous uterus, Locke L. Mackenzie, Anna Mimelman (by invitation). ¶ Papers of the evening—a] Ruptured uteri—Analysis of 59 cases with symptoms, diagnosis and pathology, Hugh C. McDowell, Buffalo (by invita-

tion); b] Histopathology of uterine scar, Norman W. Elton, Buffalo (by invitation). ¶ Discussion opened by Lewis F. McLean (by invitation).

AFFILIATED SOCIETIES

OCTOBER 16—*New York Roentgen Society* (*in affiliation with The New York Academy of Medicine*). Presentation of cases by members of the society. ¶ Executive session.

OCTOBER 18—*New York Section of the Society for Experimental Biology and Medicine*. The metabolism of human spermatozoa, John MacLeod (introduced by J. C. Hinsey). ¶ Identity of "inhibitor" and antibody in extracts of virus-induced rabbit papillomas, William F. Friedewald (introduced by Peyton Rous). ¶ The pathology of B_6 deficiency in the rat and the response to treatment with 2-methyl-3-hydroxy-4, 5-dihydroxymethylpyridine (Vitamin B_6), William Antopol, Klaus Unna (by invitation). ¶ The identity of the glycotropic (anti-insulin) substance of the anterior pituitary gland, Jerome Grattan (introduced by H. Jensen). ¶ The mechanism of pituitary gonadotropic antagonism, Sibylle Tolksdorf (introduced by H. Jensen). ¶ Acceleration of hemolysis in relation to chemical structure. II. The straight-chain alcohols, Eric Ponder, Chester Hyman (by invitation). ¶ Agglutination of endocarditis streptococci, Ward J. MacNeal, Martha Jane Spence (by invitation), Marie Wasseen (by invitation). ¶ The in-vitro production of glucuronic acid during phosphorus and chloroform poisoning, Ernest Bueding, Peter Ladewig (introduced by Isidor Greenwald).

New York Pathological Society. Because of conflict in dates with the Graduate Fortnight, this Society held no meeting in October.

NOVEMBER 20—*New York Roentgen Society* (*in affiliation with The New York Academy of Medicine*). Papers of the evening—a] Some studies on the effect of Roentgen rays on bone growth in rats—A preliminary report, Charles L. Hinckel (by invitation); b] Roentgen and histological studies of calcification in the spleen, Edwin F. Gray (by invitation); c] Anomalies of the cervical spine, Murray M. Friedman (by invitation); d] Megaesophagus, Robert P. Ball; e] Some experiences with cholan-

giography, Haig H. Kasabach. [Discussion. [Executive session.

NOVEMBER 30—*The New York Pathological Society* (*in affiliation with The New York Academy of Medicine*). Case report—Endocarditis with yeast infection of the blood stream, Silik H. Polayes, Cumberland Hospital. [Papers of the evening—a] Renal hyperparathyroidism in childhood, Dorothy H. Andersen (by invitation), Babies Hospital; b] The architecture of the amyloid kidney, Jean R. Oliver, Long Island College Hospital.



HARVEY WILLIAMS CUSHING

1869 - 1939

IN MEMORIAM

HARVEY WILLIAMS CUSHING

*Great Physician, Great Surgeon,
The Scholar in Medicine*

The death of Harvey Cushing on October seventh of this year brought genuine sorrow to the entire medical world and to every member of The New York Academy of Medicine, of which he was an Honorary Fellow these many years.

Since the death of Sir Victor Horsley, Cushing was the unquestioned leader in brain surgery and was personally responsible for vast achievements recorded in that special line of surgical endeavor. It is fortunate for us that his fame as a teacher attracted pupils from all over the world, who will be able in the United States and in many countries of Europe, to continue the good work he inaugurated. If Cushing had been merely a great surgeon, it would be immodest on my part to attempt an estimate of his services and I am certain that some one, if not several of his distinguished pupils will give a very accurate estimate of his surgical skill. The great surgeon was an even greater clinician, who kept his special line of work and thought in intimate contact with general medicine and above all, with neurology and endocrinology.

The greater the specialist the more he feels his allegiance to medicine in general. Medical science profits by his special skill in research without implying that general medicine, in any way, controls or supplants the specialty. Cushing contributed much of great value to the ever troublesome question of brain localization, while his famous work on the pituitary proved to be of fundamental importance for neurology and endocrinology. Those of us who had occasion to see him at work at the Peter Bent Brigham Hospital realized his success was due to a keen intellect, a fine grasp of neurological problems and a most painstaking technique combined

with the keenest sense of responsibility toward the fate of the patient. The patient's welfare was the prime consideration; no willingness on his part to sacrifice one inch more of brain substance than was absolutely necessary. He was indeed a great master, a marvelous teacher who set an example that every pupil would do well to follow. His pupils appreciated this and no master in medicine or surgery ever had a more devoted following. His devotion to his former teacher, Kocher, was demonstrated in most convincing fashion in 1931, in Berne, while he was attending the First International Neurological Congress.

Cushing's fellow neurologists recognized their indebtedness to him by electing him President of the American Neurological Association in 1923, four years before he was made President of the American Surgical Association. Similar honors may have meant little to him; they were showered upon him by universities here and abroad. Cambridge in England, The Royal College of Surgeons of England, the University of Toronto, of Edinburgh, the Universities of Paris, Strasbourg, Brussels, Berne paid honor to him; not to mention special degrees conferred on him by Jefferson, Dartmouth, Yale, Harvard, and Trinity College, Dublin.

In addition to the services rendered the profession, mention must be made of his distinguished work during the World War, when he was Director of the United States Base Hospital, Number Five, attached to the British Expeditionary Forces in France, and later on was appointed Senior Consultant in neurological surgery. The United States, Britain and France recognized the unusual brilliance of his work. Indefatigable worker as he was, he found time even during the years of the War to record his experiences, thoughts and well controlled emotions in a diary which was revealed later on in

"From a Surgeon's Journal" which made delightful reading when published in 1936.

The greatness of the man was revealed not only in surgical work, but in his sympathy for the untold suffering of the wounded. His talent as a writer and his broad human interests had been made known to the entire English speaking world in his two volume "Life of William Osler" for which he received the Pulitzer Prize in 1925. Osler and Cushing were indeed kindred spirits and intimate friends; both added, each in his way, to the high present-day rating of American medicine.

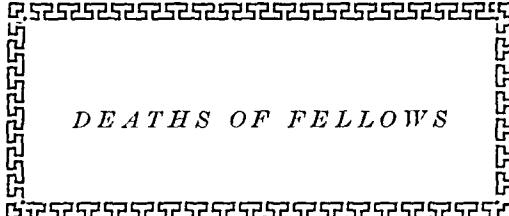
I cannot attempt to give a list of Cushing's many neurological and neurosurgical contributions. Of prime importance were "Tumors of the Acoustic Nerve" (with Doctor Bailey) in 1917; "A Classification of the Gliomata" in 1928; "Intracranial Tumors and the Pituitary Body and the Hypothalamus" in 1932. More important than all these pub-

lications are the records he left at the Peter Bent Brigham Hospital of the work done by him from 1912 to 1932, when he was retired because he had reached the age limit for surgical service.

From 1932 to 1937, he served his Alma Mater at New Haven as Sterling Professor of Neurology, thus evincing his close link to the mother specialty and resting on the laurels he had won in almost forty years of neurosurgical activity.

In spite of some physical disabilities he was mentally alert to the last, full of the joy of life and ever ready to help others with advice given in his own peculiar kindly spirit. Like Osler, Cushing was a real friend to hundreds. He himself has linked the two names. Let us continue to think of both of them as men who enriched medicine and proved that great men of science are true benefactors to all mankind.

BERNARD SACHS



DEATHS OF FELLOWS

BRIDGES, MILTON ARLANDEN: 850 Park Avenue, New York City; born in New York City, May 20, 1894; died in New York City, August 19, 1939; received the degree of B.S. from Columbia University in 1915 and graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1919; elected a Fellow of the Academy October 6, 1927.

Dr. Bridges was assistant clinical professor of medicine at the New York Post-Graduate Medical School, Columbia University; associate physician and chief of the Diagnostic Clinic at that institution; director of medicine to the Department of Correction Hospitals and secretary of its medical

board; and consulting physician to the Sea View Hospital. He was a diplomate of the American Board of Internal Medicine, a Fellow of the American College of Physicians, a Fellow of the American Medical Association and a member of the State and County Medical Societies. Dr. Bridges wrote "Dietetics for the Clinician" and "Analyses of Foods and Beverages" and lectured on various aspects of metabolism.

CASSELL, JAMES WILSON: 30 East 40 Street, New York City; born in Lexington, Kentucky, November 8, 1863; died in Scarsdale, New York, November 4, 1939; graduated in medicine from Bellevue Hospital Medical College in 1889; elected a Fellow of the Academy, March 16, 1905.

Dr. Cassell was consulting ophthalmologist to the Knickerbocker and the Manhattan Eye, Ear and Throat Hospitals. He was a Fellow of the American Medical Association and a member of the State and County Medical Societies.

CUSHING, HARVEY WILLIAMS: 789 Howard Avenue, New Haven, Connecticut; born in Cleveland, Ohio, April 8, 1869; died in New Haven, Connecticut, October 7, 1939; received degrees from Yale University, A.B., 1891, A.M. (Hon.) 1913; Sc.D., 1919; from Harvard University, A.M., M.D., 1895; Sc.D., 1931; M.D. (Hon. Causa.) Belfast, 1918; Strasbourg and Brussels, 1930; Budapest and Bern, 1931, and Paris, 1933; from Washington University, Sc.D., 1915; from Western Reserve University, LL.D., 1920; also LL.D. from Cambridge University, 1920, and Edinburgh and Glasgow Universities, 1927; and from Dartmouth College, Litt. D., 1929; elected an Honorary Fellow of the Academy November 18, 1926.

Dr. Cushing had been engaged in the practice of surgery from 1895 to 1933. He was associate professor of surgery at Johns Hopkins University, 1902-12; professor of surgery at Harvard University and surgeon-in-chief to the Peter Bent Brigham Hospital 1912-32; emeritus Sterling Professor of Neurology at Yale University and emeritus Moseley Professor of Surgery at Harvard University.

From May 1917 to March 1919, Dr. Cushing was Director of the U. S. A. Base Hospital No. 5 attached to the B. E. F. in France. He was also senior consultant in neurosurgery with the A. E. F. in 1918. The Distinguished Service Medal was awarded him by the United States Government for his work.

Dr. Cushing received the Charles Mickle Fellowship of the University of Toronto, 1922; the Cameron prize of the University of Edinburgh, 1924; and the Lister Medal (London) 1930. He was a Fellow of the American Medical Association, a Fellow of the American College of Surgeons and its president in 1923, a member of the American Neurological Association and its president in 1923, a Fellow of the American Surgical Association and its president in 1927, a Fellow of the American Academy of Arts and Sciences, an Honorary Fellow of the Royal College of Surgeons, England (1913), Ireland (1918), and Edinburgh (1927); a foreign member of the Royal Society of London, a member of the Society of Clinical Surgery, Society of Neurological Surgeons, New

England Surgical Society, American Association of Neuropathologists; American Psychiatric Association, American Association of Pathologists and Bacteriologists, American Society for Experimental Pathology; National Academy of Sciences; American Physiological Society, the Massachusetts County and State Medical Societies; an associate member of the Société Royal de Bruxelles, and a corresponding member of the Société de Biologie, and Académie de Médecine (Paris) and the Medical Chirurgical Society, Edinburgh.

Dr. Cushing was the author of "The Pituitary Body and Its Disorders," 1912; "Tumors of the Nervus Acusticus," 1917; "The Life of Sir William Osler," 1925 (Pulitzer Prize); "A Classification of the Gliomata," (with P. Bailey) 1925; "Consecratio Medici and Other Essays," 1928; "Intracranial Tumors," 1932; "Pituitary Body and Hypothalamus," 1932; and various papers dealing especially with neurological surgery.

FARRAND, LIVINGSTON: Federal Hill Road, Brewster, New York; born in Newark, New Jersey, June 14, 1867; died in New York City, November 8, 1939; received the degrees of A.B. 1888, A.M. 1891 Princeton University; M.D. 1891, College of Physicians and Surgeons, Columbia University; Ph.D. (honorary) 1924, Rensselaer Polytechnic Institute; L.H.D. 1922, Hobart College; LL.D. 1924, Colorado College and University of Denver, 1917 University of Michigan, 1919 University of Colorado, 1922 Union College, Princeton University and Colgate University; 1923 Yale University; 1925 University of Pennsylvania and Dartmouth College; 1927 University of Toronto; 1929 Columbia University; 1934 Syracuse University; 1935 Lafayette College, and in 1936 Williams College; elected an Honorary Fellow of the Academy October 3, 1929.

Dr. Farrand was president of Cornell University from 1921 to 1927 and president emeritus of that institution up to the time of his death. From 1914 to 1919 he was president of the University of Colorado. He was at Columbia University as instructor of psychology, 1893-1901; assistant professor of anthropology, 1901-03; and professor of anthropology, 1903-04.

He was a Fellow of the American Association for the Advancement of Science, a Fellow of the American Medical Association, executive secretary of the National Association for the Study of Prevention of Tuberculosis, 1905-14, treasurer of the American Public Health Association, 1912-14, a member of the American Climatological Association, the American Anthropological Association and the American Psychological Association.

GAY, FREDERICK PARKER: 630 West 168 Street, New York City, born in Boston, Massachusetts, July 22, 1874; died in New York City, July 14, 1939; received his A.B. degree from Harvard in 1897; his medical degree from Johns Hopkins University in 1901 and the degree of Sc.D. from George Washington University in 1932; elected a Fellow of the Academy February 4, 1926.

Dr. Gay, who was professor of bacteriology at Columbia University from 1923 until the time of his death, was an assistant on the Johns Hopkins Medical Commission to the Philippines in 1899; assistant demonstrator of pathology at the University of Pennsylvania, and a Fellow of the Rockefeller Institute for Medical Research, 1901-03; a research student under Jules Bordet at the Pasteur Institute, Brussels, 1903-06; bacteriologist to Danvers Insane Hospital, 1906-07; instructor in pathology at Harvard Medical School 1907-10; professor of pathology at the University of California, 1910-21 and professor of bacteriology at that institution, 1921-23. During the World War he was a major in the Medical Corps, U.S.A., assigned to the Yale Army Laboratory School. Later he served on the Commission for the Relief of Belgian Education.

Dr. Gay was a member of the medical section of the National Research Council, 1912-24, its Chairman in 1922, and Chairman of the Medical Fellowship Board, 1922-25. He was exchange professor to Belgian universities in 1926. From 1932 to 1935 he was Chairman of the Scientific Advisory Board of the Leonard Wood Memorial. Dr. Gay was a fellow of the American Medical Association, the American Association for the Advancement of Science, a member of the Association of American

Physicians, American Association of Pathologists and Bacteriologists, Society of Experimental Biology and Medicine, Association of American Bacteriologists and American Association of Immunologists and a commander of the Order of the Crown of Belgium. Dr. Gay's works included "Studies in Immunity," 1909; "Typhoid Fever," 1918; and "Agents of Disease and Host Resistance" (with others), 1935. He was also a contributor to scientific journals on bacteriology, immunology and pathology.

MCDONALD, DENNIS JOHN: 52 West 91 Street, New York City; born in New York City, February 10, 1865; died in Astoria, Long Island, New York, October 7, 1939; graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1888; elected a Fellow of the Academy February 6, 1902.

Dr. McDonald was consulting otolaryngologist to the Misericordia Hospital, a diplomate of the American Board of Otolaryngology, a Fellow of the American College of Surgeons and a member of the American Medical Association and the County and State Medical Societies.

SADLIER, JAMES EDGAR: 295 Mill Street, Poughkeepsie, New York; born in Walden, New York, March 28, 1865; died in Poughkeepsie, New York; October 9, 1939; graduated in medicine from the Albany Medical College in 1887; elected a Fellow of the Academy February 2, 1905.

Dr. Sadlier was one of the founders and surgeon to the St. Francis Hospital of Poughkeepsie, consulting surgeon to the Northern Dutchess Health Center at Rhinebeck and the Butterfield Memorial Hospital at Cold Springs. He was a Fellow of the American College of Surgeons, a Fellow of the American Medical Association, a diplomate of the American Board of Surgery, a member of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons and a former vice-president of that Association, a member of the American Society for the Control of Cancer, a member of the National Tuberculosis Association, a member of the New York State Medical Society and one of its

former presidents, and a member of the Dutchess and Putnam County Medical Societies.

SOVAK, FRANCIS WASHINGTON: 755 Park Avenue, New York City; born in New York City, July 4, 1885; died in New York City, October 27, 1939; graduated in medicine from New York University and Bellevue Medical College in 1911; elected a Fellow of the Academy January 5, 1922.

Dr. Sovak was clinical professor of obstetrics and gynecology at New York University College of Medicine, assistant attending gynecologist to the Polyclinic Hospital, attending gynecologist to the Misericordia Hospital, and associate attending gynecologist and obstetrician to Bellevue Hospital. He was a diplomate of the American Board of Obstetrics and Gynecology, a Fellow of the American College of Surgeons, a Fellow of the American Medical Association, and a member of the County and State Medical Societies.

STEIN, SYDNEY ABRAHAM: 200 West 87 Street, New York City; born in New York City, November 22, 1867; died in New York City, September 29, 1939; received the degree of B.A. from the College of the City of New York in 1888 and graduated in medicine from the College of Physicians and Surgeons, Columbia University, in 1891; elected a Fellow of the Academy April 1, 1909. He was a Fellow of the American Medical Association and a member of the County and State Medical Societies.

STEVENSON, GEORGE: 526 West 111 Street, New York City; born in New York City, July 24, 1862; died in Mt. Morris, New York, September 11, 1939; graduated in medicine from Jefferson Medical College, Philadelphia, in 1903; elected a Fellow of the Academy November 2, 1916.

Dr. Stevenson was a Fellow of the American Medical Association, and a member of the National Society for the Advancement

of Gastroenterology, the Association for Research in Nervous and Mental Disease, and the State and County Medical Societies.

WOLLSTEIN, MARTHA: 35-59 — 164 Street, Flushing, New York; born in New York City, November 21, 1868; died in New York City, September 30, 1939; graduated in medicine from the Woman's Medical College of the New York Infirmary for Women and Children in 1889; elected a Fellow of the Academy December 5, 1901.

Dr. Wollstein was pathologist to the Babies Hospital from 1892 until her retirement in 1935. She was demonstrator of histology at the Woman's Medical College, 1890-93, and demonstrator of pathology at this institution, 1893-99. In 1906, and until her resignation in 1921, Dr. Wollstein was an associate member of the Rockefeller Institute for Medical Research. She was associated with the College of Physicians and Surgeons, Columbia University, as associate in diseases of children, 1925-28; as assistant clinical professor of diseases of children, 1928-30; and as assistant professor of diseases of children and of pathology, 1930-35.

Dr. Wollstein was Chairman of the Pediatric Section of the Academy, 1933-34, and a member of the American Pediatric Society, Society of Experimental Biology and Medicine, the Harvey Society, the New York Pathological Society and the Association of Pathologists and Bacteriologists.

ZEISS, ROBERT FREDERICK: 1 East 63 Street, New York City; born in Brenham, Texas, November 21, 1892; died in New York City, August 8, 1939; graduated in medicine from the University of Texas School of Medicine in 1916; elected a Fellow of the Academy November 6, 1930.

Dr. Zeiss was consulting urologist to the United States Marine Hospital, a Fellow of the American Medical Association, a member of the American Urological Association and a member of the County and State Medical Societies.

LECTURES TO THE LAITY

1939-1940

The Fourth Series of Lectures given during the 1938-1939 season has lived up to the high standard established in the preceding series. These lectures, dealing with the history and romance of medicine, had an average attendance of five hundred at each lecture which speaks well for the enthusiasm with which these speakers were received by the lay public.

Hitherto the lectures have dealt primarily with the development, romance and philosophy of medicine. The committee in charge recognizes, from the requests made by many lecture followers, that the lay public is primarily interested in its own well-being and that of the community. With this in mind, an effort has been made to depart from historical medicine to a certain degree and to select topics which will be of more immediate and practical service.

November 30, 1939 *The inheritance of mental disease*
ABRAHAM MYERSON

Clinical Professor of Psychiatry, Harvard Medical School

December 28, 1939 *The ascent from Bedlam*
RICHARD H. HUTCHINGS

Emeritus Professor of Clinical Psychiatry, Syracuse University Medical College

January 25, 1940 *The story of our knowledge of the blood*
PAUL REZNIKOFF

Assistant Professor of Clinical Medicine, Cornell University Medical College

February 29, 1940 *The romance of bronchoscopy*
CHEVALIER JACKSON

Honorary Professor of Bronchoesophagology, Temple University School of Medicine

March 28, 1940 *The story of the viruses*
THOMAS M. RIVERS

Director, The Hospital of The Rockefeller Institute for Medical Research

April 25, 1940 *Chemical warfare against disease*
PERRIN H. LONG

Associate Professor of Medicine, Johns Hopkins University

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